

SPECIAL SECTIONS—

FOR THE CONSTRUCTOR : BETTER RADIO

MODERN WIRELESS

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VOL. XVIII. N° 70

OCT. 1932

Inside:—

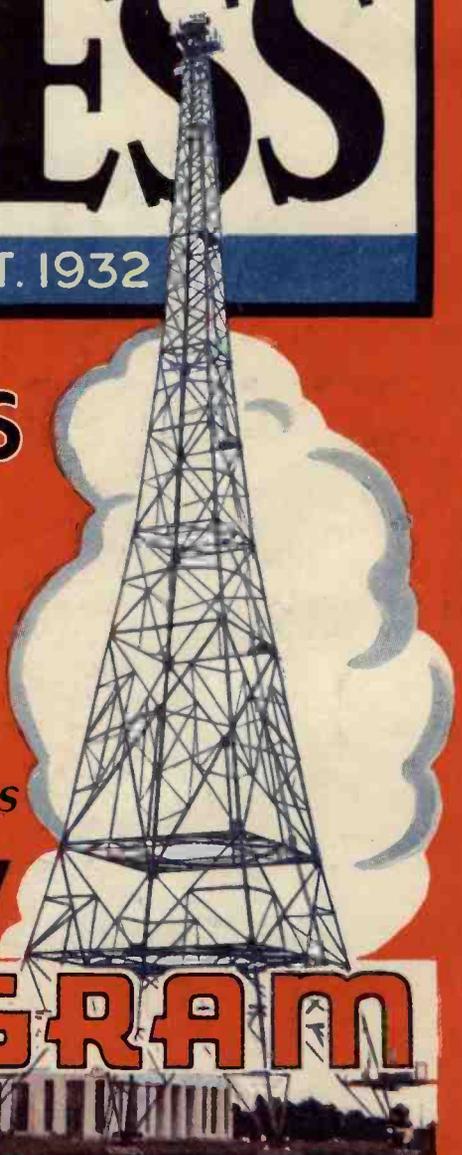
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SPECIAL SUPPLEMENT, "THE WORLD'S PROGRAMMES," PAGES 347-364.
(See page 347 for Contents.)

As some of the arrangements and specialties described in this Journal may be the subject of Letters Patent the amateur and trader would be well advised to obtain permission of the patentee to use the patents before doing so.

Edited by **NORMAN EDWARDS.**
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 Scientific Adviser: **J. H. T. ROBERTS, D.Sc., F.Inst.P.**



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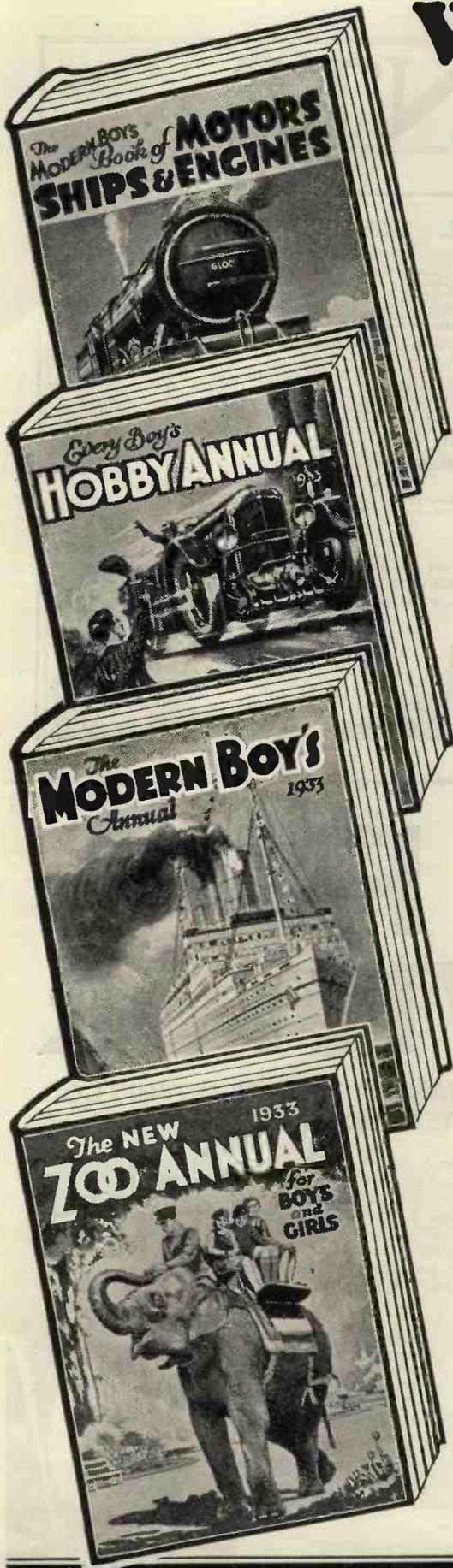
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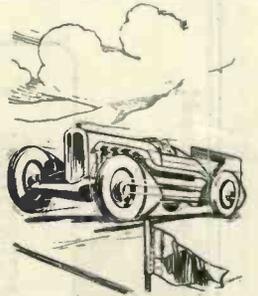
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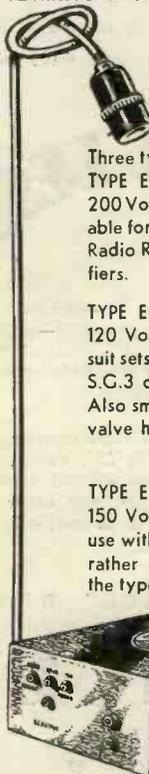
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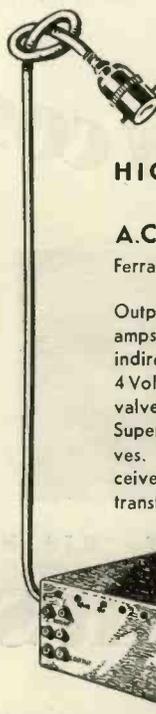
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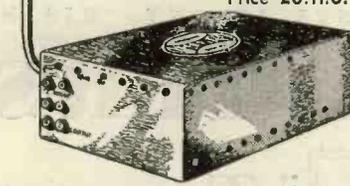
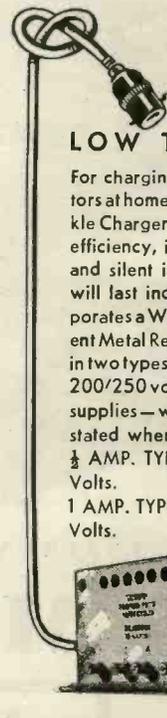


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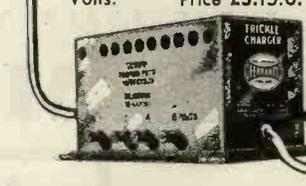
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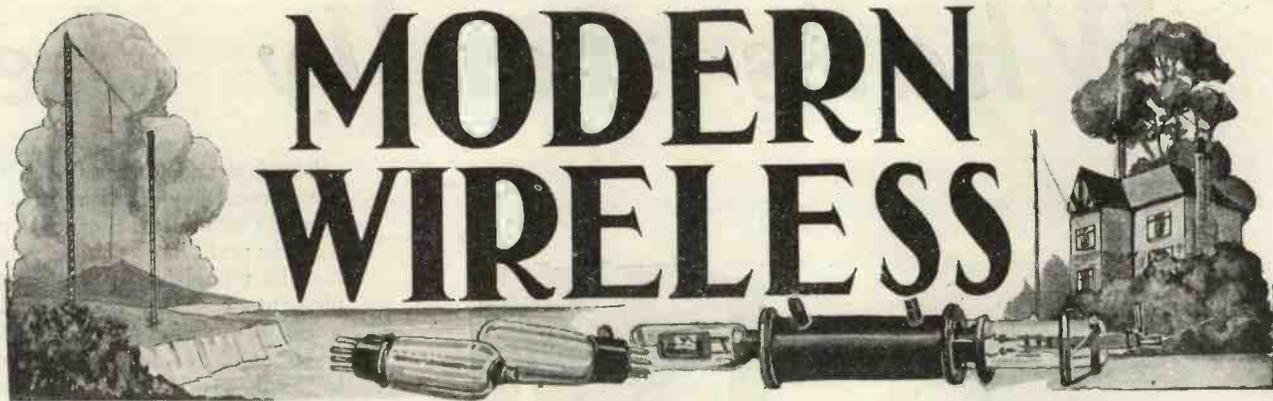
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Vol. XVIII. No. 70.

BRITAIN'S LEADING RADIO MAGAZINE

OCTOBER, 1932.

A De-Luxe Radio-gram—About the “Mu-Tone”—Features which Grow in Popularity—The Conference at Madrid—Serious Problems.

Our Constructors' Section

JUDGING by the number of letters we have received recently, the introduction of the special constructors' section in MODERN WIRELESS has proved widely popular. Many readers comment on the innovation in a way which suggests that they greatly prefer the practical section of this magazine in a concentrated form instead of being interspersed with other and more general articles.

In this issue we offer another fine constructor section, in which our readers will find full details of the “Mu-Tone.” This may be aptly described as a de-luxe radio-gram at a very reasonable cost.

Readers must bear with us if we harp on this question of costs with reference to MODERN WIRELESS sets, but it should be remembered that in these hard times every penny counts when you are building a set, and it is our constant endeavour when designing never mind what type of receiver, for the edification of our readers, to keep the initial outlay as low as possible, but always, of course, consistent with thoroughly satisfactory operative efficiency.

Merits of the “Mu-Tone”

THIS particular set, the “Mu-Tone,” is a very handsome piece of work when finished, and it wouldn't be exaggerating to say that it would grace any room; and as for its radio and record qualities, well, readers had better build it and judge for themselves!

On test we can only say that it lived up to the very high standard we set when testing MODERN WIRELESS designs—and that's saying a good deal. No doubt many of our readers saw the original model at Olympia, and so quite a number who visited our Stand and who passed some very complimentary remarks concerning the set will need no further incentive to set about the fascinating job of building the “Mu-Tone.”

The D.C. version of the “Diodion” has also been included in this issue in response to many requests from readers. Little need be said about it here, except that it is a D.C. mains version of MODERN WIRELESS' recent successful production.

A further instalment of “Better Radio”—a new feature

which is packed with practical and concentrated hints and tips for all radio enthusiasts—will be found on perusal not only to live up to its qualification of “practical,” but will prove to be a section of this magazine which will grow in popularity and usefulness as a rolled snowball gathers in size and significance in winter-time.

The Madrid Conference

As we go to press, news from Madrid is very disquieting. To begin with, it is reported in the Press that one of the official British representatives, commenting upon the growing menace of ether congestion, and dealing with the general problems of interference, made the rather astounding suggestion that a solution to the problem might be found if many high-power stations—not only in Europe, but in this country as well—reduced power to an extent which would enable those stations to carry on adequately to serve National interests only.

In other words, it is seriously suggested by an accredited representative of the B.B.C. at the Conference that in the case of Germany, say, German high-power stations should reduce power to a degree which would be just sufficient to give a satisfactory service to German listeners only.

And this, mind you, is a suggestion put forward by an official of a Corporation which, in the past—we say “in the past” advisedly—has, to use a colloquialism, made a great song and dance about the significance and importance of its motto—“Nation shall speak peace unto Nation!”

Another Serious Question

BUT other serious questions arise when we look more closely into this dangerous “remedy.” Whatever the B.B.C. officials may think of the service provided for British listeners, and however complacent they may be regarding its high cultural standard, the fact indubitably remains that there is a very big section of the public in this country which finds the B.B.C. programmes, to put it mildly, unsatisfactory.

In many cases we should feel justified in saying that thousands of listeners found many of the B.B.C. programmes boring, insipid, and lacking in true entertainment value; and that, in consequence, they continued to

(Continued on page 404.)



What's Really the

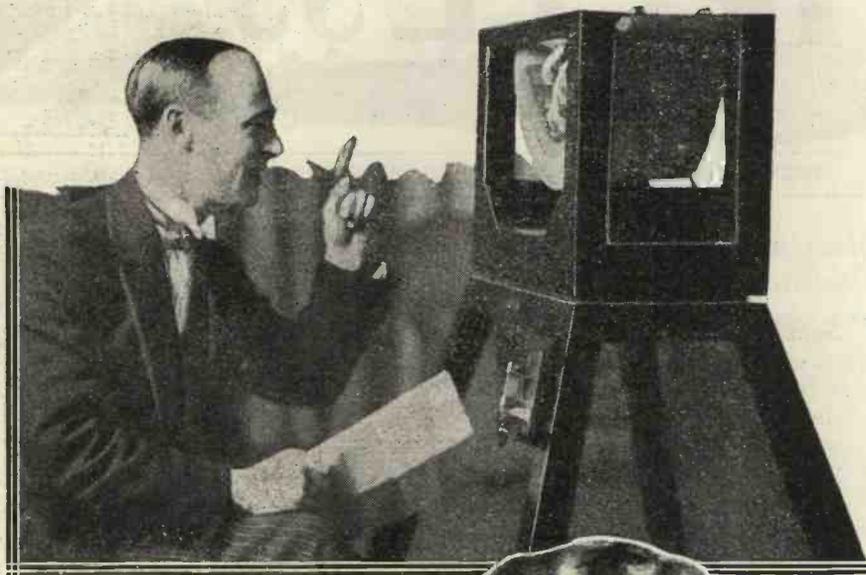
The first and foremost fault of the present-day British Broadcasting Corporation, then, is that, from the performer's point of view, they have banished all the former pleasant easiness from studio work. Do you remember how, when the old company gave way to the new regime, we feared lest the crippling bondage of red-tape should make itself felt, tying the artiste with regulations?

A Big Change

It is beginning to do so. We tend now to forget the free and easy days of six years ago when the B.B.C. was run on a nonchalant mixture of Bohemianism and the companionable desire to amuse.

In 1932 there is much more law and order. The microphone is a greater god, the studio a temple in which you must do this and mustn't do that.

The Corporation makes much of the fact that it is not a Government Department, but a public service, a public authority constituted under Royal Charter. This makes me feel rather Alice-in-Wonderlandish, as if a County



THE B.B.C. seems to have a habit of losing its most charming and useful employees with monotonous regularity. Can it be that He Who Must Be Obeyed thinks it's bad for listeners to have too much of what they like?

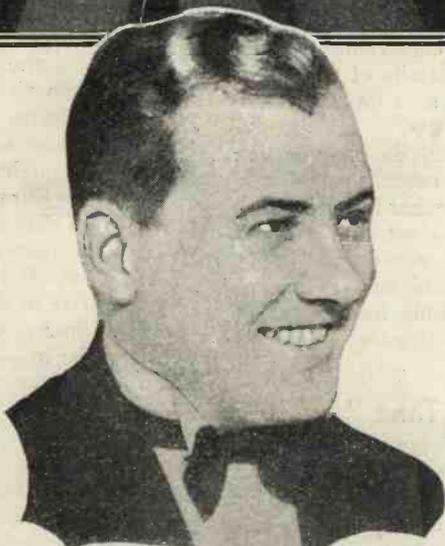
"If an employer makes a man happy in his job and pays him fairly, that man will not leave him, especially in these hard times; the B.B.C.'s money is as good as another's. What then can be the matter?"

Collecting Information

I quote from a recent comment in our contemporary, "Popular Wireless," upon the separation of Jack Payne and the B.B.C. I quote this because, as a man whose main business in life is to find out things, it gave me an idea. What really is the matter with the B.B.C.?

I'm not referring to the programmes, which, good or bad, do give a lot of satisfaction. I'm talking about the administrative side. What is wrong with that?

I've been making it my business during the past week, by dint of discreetly questioning both the programme makers and the people featured by them, to find out, and think I've got down to the several roots of the matter.



OLD FAVOURITES

To the left is Jack Payne, probably the most popular of all broadcasting personalities, and above him is a photograph of one of the earliest and most "informal" B.B.C. "Uncles"—Mr. Rex Palmer. The picture below shows another old favourite—the comedian, John Henry.



Matter with the B.B.C.?

Is the B.B.C. suffering from a sort of blight, which hampers the artistes and causes its most popular employees to become dissatisfied? And, if so, what can be done about it? These are the important issues dealt with in this thoughtful and outspoken article.

BY A SPECIAL INVESTIGATOR.

Council had said: "We have nothing to do with the Board of Education nor the Ministry of Health."

The B.B.C. is suffering from the blight that afflicts all bodies of its type. A public service admittedly cannot be run without some attention to routine and formality. But it should be restricted to the administrative side of the B.B.C.'s work, and on no account allowed to creep into the programme section, hampering the artiste.

Hampering the Artistes

Is it doubtful whether the men and women who entertain us, be they comedians or great composers, are hampered? Conversation with these personalities (under a due pledge not to divulge their names) will assure anyone.

Comfortably installed at Broadcasting House they may have an official receptionist and nicely furnished studios, but they do not yet sufficiently take into consideration that peculiar something which, for want of a better name, is usually described as the "artistic temperament."

THE 2LO OF LONG AGO



The portrait above is of Mr. G. Brown, who was appointed a Governor of the British Broadcasting Corporation, in succession to Sir Gordon Nairne.

In the circle is Capt. P. P. Eckersley, the first Chief Engineer of the B.B.C., and a hearty hater of red-tape and formalities. He built up the technical side of broadcasting and originated the Regional scheme.

The lower photograph shows a 1922 broadcast—note the old type of insensitive microphone, and its closeness to the singer.

That temperament is not the prerogative solely of poets and highbrow musicians. It may be possessed by a comedian or a dance band leader. It is found in many thinkers and in most entertainers—in the vast majority of broadcasters, in fact.

A Desire for Freedom

And I am not far wrong in saying that those who possess it are not only unusually sensitive, but that also they have a great desire for freedom—freedom of thought, deed, and expression. To the fulfilment of this desire, broadcasting at present offers four hindrances at least.

Are the Radio Artistes Paid Sufficiently?

The first and most unavoidable—the microphone itself! As Leonard Henry said to me: “Broadcasting saps one’s vitality more than anything I know. At the end of a long programme I am just about all in.”

The Awesome “Mike”

And was it not Jack Payne himself who declared: “If I had gone on broadcasting at the rate that I was going I should soon have been a nervous wreck”? The awareness of the vast army listening to them proves fatal to nine radio artistes out of ten.

Broadcasters may become accustomed to the surroundings of the studio, but few ever really conquer that strange Dracula-like power of the “mike.” Old stars seek other fields or give place to new, or drop out of the running altogether, not because they run short of material, but

respect with some commercial firms.

They are able to spend £580,000 per annum on programmes, including fees and royalties for artistes and music and the use of telephone lines and the News Bulletin rights, true; but this boils down to £1,500 a day, and if you take ten hours or so as the average daily amount of broadcasting time, to £150 an hour. This again must be divided up among the stations, three at the very least, and so you have £50 an hour to spend.

Poor Remuneration

Not really so very much! I know a man who for many years wrote radio plays. He received five guineas for every fifteen minutes of performance; say, sixty guineas for all the broadcast performances of a full-length play, and nothing more.

That sixty guineas had to recom-

lies with listeners themselves. There are too many licence dodgers.

Over the greater part of England only one person in ten owns a licence, and it is certain that far more than ten per cent of the population own wireless sets. The figures speak for themselves.

Petty Restrictions

Again, there is the matter of this freedom.

Very few creative or interpretative artistes are allowed by the B.B.C. to do as they please. A conductor, for instance, is hampered in the choice of music for his programme or orchestra by a number of petty restrictions.

He must not perform a piece that has been played frequently before—unless without very good reason, for someone at the B.B.C. seems to think educational value far more important than popularity—and he must conform to studio conditions (since no one seems to have thought of making studio conditions conform to him). Most important of all, he may never be entirely independent.

Every artiste likes to feel he is his own master, able to do practically as he wishes. I venture to suggest that those who accept fees for contributions to broadcast programmes cannot always have their own way and so are not so much attracted by the studio as by the stage or concert hall.

But it seems to me that a full-time committee of twelve would be better than a Director-General and a Board of Governors, because it would be a more acceptable constitution to those most directly affected by it—the performers who possess the artistic temperament.

A Jury System

It would enable them to feel freer spirits, rather than cogs in a machine. The joint decision of twelve men must always be more unbiased than the decision of one, and that is why the jury system was introduced into Law. It is the present lack of a proper jury to decide such matters as salaries and fees and what rights an artiste shall possess that retards present broadcasting progress.

I am not biased myself. These considered opinions of mine are the considered opinions of a hundred others—those whom I have questioned and who should know.

FROM THE MINE TO COVENT GARDEN



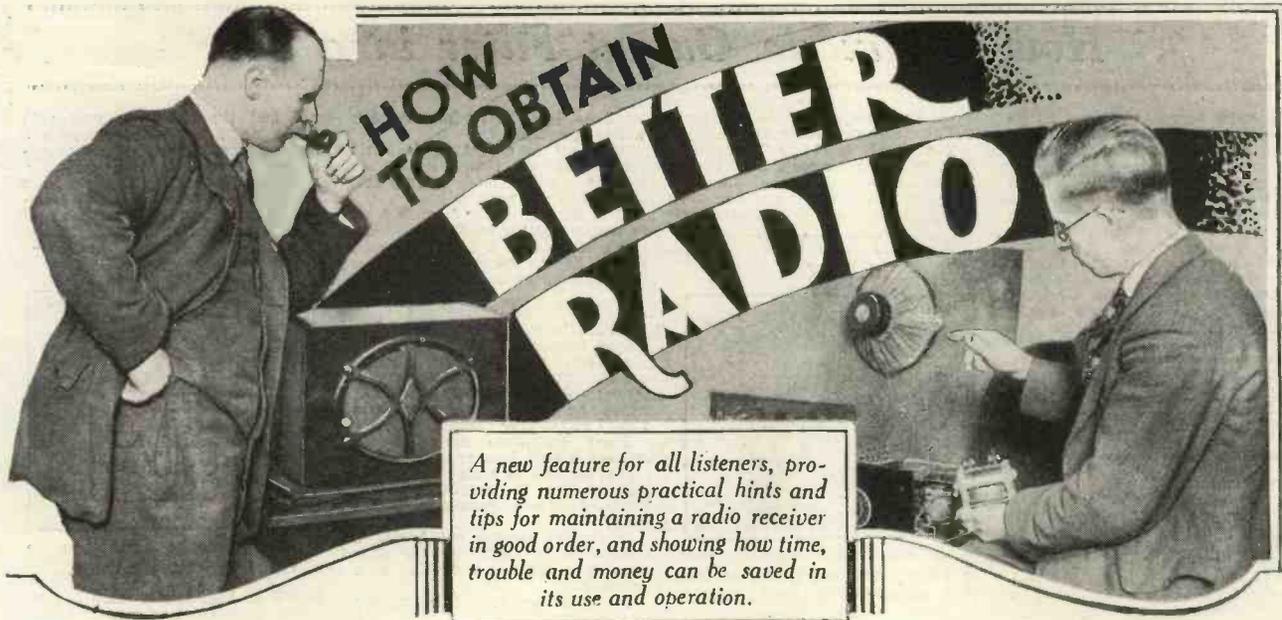
John McDermott, conductor of the popular dance orchestra at the Royal Opera House, Covent Garden, started life as a Scottish miner. He joined the Black Watch as a band-boy, and soon worked his way up until he became a master of military band music.

because this peculiar force of the microphone eventually overcomes them. And the remedy does not lie in making the studio proceedings more and more solemn.

Then the second consideration which I believe to be marked down against the B.B.C. by those who can “supply the goods” is that of money. Unquestionably, the Corporation cannot at the moment compete in this

pense him for weeks of work. Now he goes in for writing books, and plays for the orthodox theatre, and makes at least ten times as much money for the same expenditure of energy.

If a man who has made his name by the aid of broadcasting accepts a good contract for outside work when the B.B.C. cannot offer equal terms, he cannot be blamed. The remedy here



ALTHOUGH diversity will always be the keynote of "Better Radio," we shall at times give greater prominence to some aspects of home radio than others.

For example, this month questions concerning quality occupy a fair proportion of our space. We believe this is fully justified by the fact that listeners are, on the whole, paying much greater attention to the quality of their outputs than was formerly the case.

On every hand we hear keen criticism of the performance of various sets and loudspeakers, and we are of the opinion that the higher standard of reproduction which is a feature of 1932 radio is largely the result of this more keenly critical attitude of the public.

YOUR AERIAL

MODERN radio receivers operate with ample margin of power. Wireless has ceased to be an experimental juggling with infinitely small energies and inefficient amplification.

The energy collected by even a high and effective aerial from a

OVERGROWING LEAVES



When erecting an aerial make sure that no bushes or trees are likely, in the course of time, to grow over any part of the system.

powerful transmitter is still small, but present-day valves and components make much more of it.

Therefore, the listener who is unable to erect an aerial equal in efficiency to a Marconi station antenna need not feel that he is suffering from a hopeless handicap.

As a matter of fact, there has been a great deal of exaggeration in regard to aerial requirements in the past

odd foot or so of height doesn't matter one scrap—so long as it is a solo factor and not one of a bunch.

We can, with advantage, emphasise this point. There is an old Scottish saying that "Many a mickle makes a muckle," and it aptly applies in this instance.

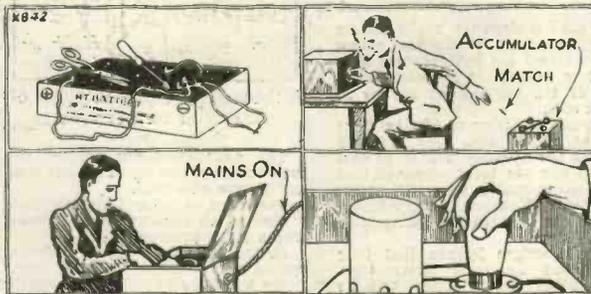
A radio outfit which possesses a whole host of minor faults will give pretty poor results, even though

Well, we would say that it is more to the listener's advantage to buy the best valves and the higher voltage H.T. battery, or mains unit, up to the maximum recommended for the valves, than to budget for a disproportionate expenditure of money on an aerial.

In any case, quality ought to be considered before volume and mere numbers of stations.

However, all this must not be read as an argument in favour of aerial neglect. If an aerial must be technically poor in size and form because of space or other limitations, it should at least be as efficient as is possible in the circumstances.

MARCONI WOULDN'T DO IT!



and there was a time when aerial efficiency assumed the proportions of a fetish.

It may even to-day sound almost heretical when we say that the main practical advantage of stranded wire over single wire for a listener's aerial is that the stranded type will be more flexible and is stronger!

There may be measurable differences between the energies they pick up from a given transmission, but only measurable with delicate instruments. The efficiency of an aerial has to be reduced very considerably before there will be an audible difference.

And the same with height. An

any single one of those faults alone might have little or no appreciable effect.

On the other hand, it is often necessary to compromise, or, at least, it may be more convenient to do so, and in such a case it is as well to be aware of the relative importance of the various factors concerned.

For example, when installing an outfit there may be numerous problems to be solved. Finances may demand close consideration and, let us say, an outdoor aerial of a highly efficient nature might be expensive to install if roof fittings and a pole were needed.

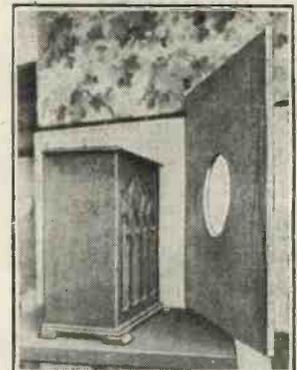
DOWN THE SCALE

THE lower the note the more elusive it becomes. The high notes are more amenable to discipline as it were. With a sharply angled loudspeaker cone diaphragm, the high notes are ejected almost like the rays of a searchlight.

In other words, they are very directional in character. On the other hand, the low notes tend to travel from the diaphragm in all directions.

They even try to wander sideways and round to the back.

BAFFLING THE BASS



Either a cabinet or a baffle is essential to prevent the bass notes from cancelling themselves out—as they try to do!

SOME of the odd noises heard in a radio set from time to time are apt to be confusing to those without long wireless experience.

After months of comparative quietness, peculiar sounds are apt suddenly to burst into prominence.

These may be due to any one of a number of causes. It might happen that a neighbour has installed a violet-ray outfit and even an X-ray. Such devices as these set up harsh, crackling noises of persistent, unvarying volume.

Then, again, listeners near the coast

WHAT ARE THOSE NOISES?

refrigerators and so on, will often generate noises in wireless sets, but generally not over an extensive area.

It is difficult to discover whether a noise is due to an internal fault in a set unless both aerial and earth are disconnected. Even then, in the case of a mains set, a great number of peculiar sounds originate through irregularities in the mains supply.

or large rivers may suddenly receive interference from ships' wireless transmitters.

Electrical apparatus such as vacuum cleaners,

How to Fix an Output Filter in a Set

In order to reduce this, a baffle-board can be employed to make the path between the front and back of the diaphragm longer.

A cabinet has the same effect and is of a more generally convenient form. If the cabinet could be totally enclosed except for its front aperture, the "baffling" would be good, although trouble from "box resonance" would have to be anticipated. A small cabinet with an open back is equal to only a small baffle in its effectiveness.

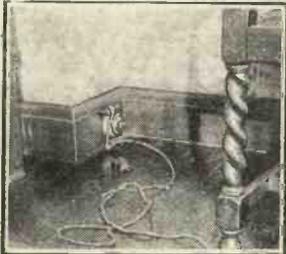
POWER POINTERS

THE lead with which a mains set is connected to a power point carries the full voltage of the mains.

In view of the precautions taken by installation engineers to render the house wiring trustworthy and safe, it is obviously necessary to be careful with wiring extensions which are "plugged in."

It is a dangerous practice to run ill-protected leads of a more or less

KEEP IT SHORT



The wires which join a mains set to the power point carry the full mains voltage, and should be dealt with carefully.

considerable length, and allow them to lie untidily on the floor as is illustrated in the accompanying photo.

Adequately protected flexible cable should be employed. A fabric covering is insufficient protection.

And the lead ought to be kept just as short as is possible, and the set so placed that it is impossible that any strain will be imposed on its mains-connecting lead or that it will be trodden underfoot.

WATCH THAT NEEDLE!

EVERY battery set user could with advantage provide permanent employment for a milliammeter. Connected up in the manner we shall indicate, it will show at a glance whether or not the set and batteries are in good order, and whether or not there is any distortion tending to occur.

It is not necessary to purchase an expensive "moving coil" instrument, because it is not wanted to give precision measurement.

A cheap milliammeter with a printed scale will prove adequate.

Fairly Wide Range

However, it must be capable of covering a fairly wide range. Aim at a range up to a quarter or third greater than the total H.T. current consumption of the set.

Supposing you have a three-valve set and, according to the maker's specifications, the valves take 2,

4 and 8 milliamperes at the H.T. and G.B. voltages you commonly employ.

The total is 14 milliamperes. So a milliammeter registering up to 20 milliamperes will be suitable. It doesn't want to be more or the needle movement will be restricted

AN EXCELLENT CHECK



A milliammeter enables you to check the condition of the H.T. supply and is also useful for indicating distortion.

The milliammeter should be connected between the H.T. negative terminal of the set and the H.T. negative plug of the H.T. battery, so that all the H.T. current passes through it. In a future issue we will discuss the other indications it will provide.

A FILTER FOR YOUR SPEAKER

EVERY modern set ought to have some form of filtering output so that the H.T. current does not flow beyond the immediate confines of the set and its battery or mains unit.

The cost of fitting an efficient filter will be about 12s., and we will tabulate the advantages of it, so that readers can see for themselves that it represents money very well spent.

1. The H.T. current is stopped from flowing out through the loudspeaker leads.

2. It therefore follows that long loudspeaker leads of fairly thin, not-to-well-protected wires can be run to any distance with safety.

3. When there is no transformer built in the speaker the windings of this are not strained by having the

EASILY ADDED



The two necessary items, an L.F. choke and a fixed condenser, are easily wired into almost any set.

full H.T. current flow of the power valve imposed upon them.

4. The loudspeaker is not so liable to suffer from saturation of its magnetic system.

5. There will be a smaller drop of H.T. volts across a filter choke than across the average loudspeaker, and so a greater plate voltage can be achieved.

It often happens that a filter of some kind is included in the original

set these days, for its importance is widely recognised.

When it is absent, it is fairly certain that the reason is that an attempt has been made to keep cost down as low as possible.

It is for the owner of such a set to decide whether he thinks the expense of adding a filter is worth while. In our opinion there can be no argument about that point!

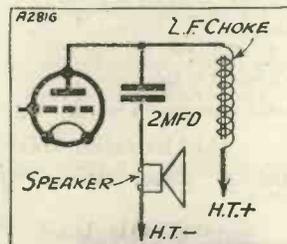
Filters take two forms, viz., the output transformer and the choke-condenser. Most modern moving-coil loudspeakers incorporate a transformer which, given certain conditions, serves as a filter which will do all that a good output filter should.

These conditions are that the speaker is built into, or is very close to, the set, and its leads short (only a foot or two in length) and well insulated and well separated from other leads.

If another speaker not having a transformer is used, then the filter once more becomes something of a necessity.

It should be noticed in passing that it doesn't matter if there is a transformer in any one or more of the loudspeakers used; a filter in no way upsets the output of set.

A SIMPLE CIRCUIT



A theoretical representation of the filter connections.

The audio-frequency current remains more or less the same, and does not become abnormal.

The most popular form of filter is that which employs an L.F. choke and a fixed condenser.

In the case of a pentode valve a special pentode choke should be used.

We will describe the way in which a filter works, as this will make it easier for readers to apply filters to their sets. It will be appreciated that slight differences exist which render it difficult for us to give detailed practical directions which can be applied to every one of the hundreds of different receivers which have been made and sold during the past few years.

A small diagram appears in the third column of this page, and it shows the theoretical circuit of a choke-condenser filter.

The "H.T. plus" indicates the positive H.T. socket on the H.T. battery or mains unit. Normally the loudspeaker is joined between this and the plate of the valve—in fact, directly in the anode circuit.

Through the Speaker

Therefore, all the current which flows from the H.T. battery (or unit) through the H.T. positive terminal of it indicated in our diagram, flows through the loudspeaker.

The filter obviates that. In place of the loudspeaker we put an L.F. choke, and this completes the H.T. battery circuit as before, but the choke is designed to carry plenty of current without distress.

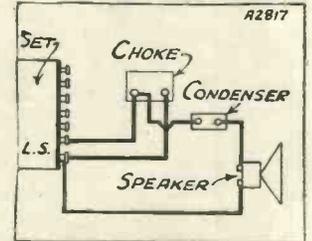
The loudspeaker is joined to a fixed condenser, and these two are connected across the plate of the valve and H.T. negative.

The H.T. current flows through this path because the fixed condenser offers a complete barrier against it. And the audio-frequency impulses do

not find the choke an easy path (it is an L.F. choke, remember), although they can still get to the loudspeaker through the fixed condenser.

If there isn't room to fix a filter inside the set, it can be added externally, as our second diagram shows. It

EXTERNALLY CONNECTED



Showing how a filter can be connected outside the set.

should be built into a small box on which there are four terminals, two for the loudspeaker and two for the loudspeaker terminals of the set.

The wires for joining them up should, of course, be kept very short—a matter of inches.

A very excellent choke for loudspeaker filters is shown in the photo, and alternatively there are ordinary L.F. chokes of 25 henries or so which will serve quite well.

The fixed condenser must have a capacity of at least 2 mfd.

THEY DON'T LIKE THE SUN!

THE so-called "dry" battery which is used in radio for H.T. and grid-bias purposes is not in actuality "dry."

It is a modification of the original Leclanché system in which zinc, carbon, and solution of sal-ammoniac figures.

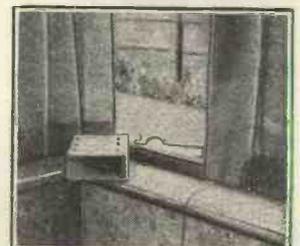
But instead of this solution being in the form of a fluid, it is made up as a paste something of the consistency of the paste used for mounting photographs.

Secret Formulae

The paste is a mixture of sal-ammoniac and certain other materials. The different manufacturers have their own secret formulae.

The object of secrecy is to prevent rivals learning how to duplicate their processes of manufacture. That may be obvious, but the fact that one of

BAD FOR THE BATTERY



H.T. batteries should be kept in cool places well away from fires and sunshine.

the most treasured secrets is how the paste is made so that it won't easily go "dry," may not be so widely known.

You see, if your H.T. battery really were "dry" it couldn't work. The maker does his bit towards rendering

There'll Be Another Instalment of "Better Radio" Next Month

it difficult for the battery to live up to its name, and it is to your benefit to further the good work when the battery passes to your hands.

Keep it in a cool, shady place, well away from fires, hot-water pipes, and other such things.

CHARGING YOUR OWN

WE have often been asked whether we think it is worth the listener's while to charge his own accumulator. In our opinion, there is not a great deal to be said for taking the battery to a charging station to have it done.

To start with, some charging stations are rather careless with small radio accumulators, and handle them as though they were large and very strongly-built car accumulators.

A TROUBLE SAVER



By using a trickle-charger the necessity of having two L.T. batteries and of carrying them to and from a charging station is obviated.

We are well-aware that there are also charging stations which look after accumulators with scrupulous care.

But home-charging results in the battery always being under the listener's own control. Moreover, it does away with the urgent necessity of having two batteries, for if a trickle-charger is used the battery can be left to charge up during the night, when, of course, the radio set is not in use. In a later issue we will give you some home-charging hints.

JUDGING YOUR QUALITY

THOSE who do a great deal of listening on the one set are apt to get rather biased in their opinions as to what constitutes good quality.

Human ears are adaptable instruments. Indeed, they are sometimes too adaptable. There are listeners still using four- or five-year old loudspeakers who have got so accustomed to the poor quality these give

THE REAL THING



Listeners are urged to hear original bands and orchestras and to make mental comparisons with the outputs of their sets.

that a good modern loudspeaker would at first actually offend their hearing.

Also there are those who are very uncritical of musical or speech sounds, and who quickly accept distortion as a regular entertainment.

Why should we worry if they are satisfied, it might well be asked. We do worry because our mission in life is "Better Radio," and we firmly believe that greater pleasure is obtained by all from good-quality radio than from second-rate reproductions.

Continual listening to a first-class radio outfit teaches one to appreciate finer points in music which are completely smothered by inefficient apparatus, and never allowed to get through at all.

Listen Critically

It is a good plan to listen critically to as much original band music of the various kinds broadcast as is possible, and make mental comparisons between it and the same type of sound as heard through one's radio.

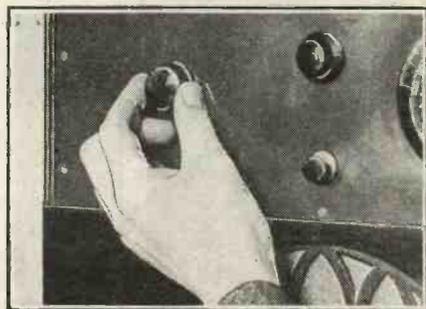
TIPS ON VOLUME CONTROLS

DON'T regard a volume control as nothing but a loudness tap. It is a control which, if handled carefully, will enable you to balance your reproduction.

Roughly speaking, there are two kinds of volume control, the pre-detector and the L.F. kinds.

Many of the "pre-detector" volume controls also affect selectivity. We are not entirely in favour of these, for it sometimes happens that the loudness of a station wants increasing without reducing the selectivity.

DO YOU USE ONE ?



A volume control is a most useful device and should not be handled merely as a plain "loudness tap."

For example, to get the desired station tuned in it may be necessary to have greater selectivity because of the jamming of an adjacent station.

But you cannot afford to throw away much of the desired station's volume in achieving separation. It may be argued that it is impossible to do otherwise.

We suggest there should be greater L.F. amplification which is normally held down by considerable volume controlling. There is then a margin of further magnification when the greater selectivity reduces power.

An Anachronism

However, a selectivity adjustment is something of an anachronism anyway, though in special cases its presence can be justified.

The actual volume control frequently takes the form of a potentiometer in the L.F. section of the set.

An ordinary potentiometer is not ideal for the purpose; one designed on a logarithmic basis is greatly to be preferred.

With this a direct relation between the movement of the knob of the component and the volume is possible.

Ordinarily, a volume control is liable to suffer from two faults. Either the control is narrow, i.e. it has little practical effect, or there is a too "steep" variation.

The logarithmic principle overcomes both limitations. A half rotation and you get half volume, a quarter rotation and you get a quarter the volume as gauged in actual loudness, and so on.

With a variable-mu valve you get automatic control of volume. The variable-mu is an S.G. valve of a special design, and it is ingenious in theory and excellent in practice.

Above a certain point it tends to amplify less, so that it passes energy on to the next valve in a more even form instead of in the widely fluctuating manner of the ordinary S.G.

In short, although various stations may be picked up with very different degrees of effectiveness, this one very weakly and that one very strongly, the variable-mu hands them through to the detector with a more or less standardised degree of strength.

Levelled Down

The weak stations will be just as loud as with an ordinary S.G., but the very powerful ones will be levelled down to a more convenient intensity.

It should be noted, however, that a variable-mu cannot be "dropped in" any set in place of the normal S.G. It requires special circuit conditions.

We have said that the conventional volume control should not be handled merely as a tap. By this we mean it ought to be manipulated in conjunction with the other set adjustments.

We refer especially to the L.F. type of control. There is a temptation to keep this "well up," so that it is easy to swing from station to station.

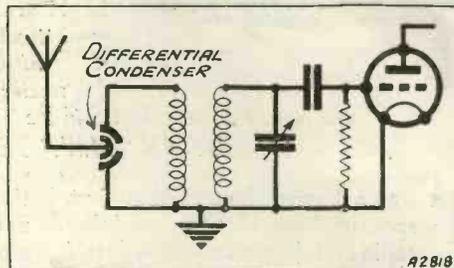
But it will generally be found that clearer reception and a greater freedom from background noises results when the tuning is close, with perhaps a little reaction to assist, and the volume control is kept as far down as possible.

On the other hand, it may at times be easier to get rid of an interfering station by "tuning up" on the volume control (by which we mean increasing the L.F. amplification) and juggling the tuning adjustments out of step.

In such a case the reaction should be set at minimum.

It must not be forgotten that some sets are not designed to take full

SELECTIVITY ADJUSTMENT



A type of selectivity adjustment which also makes an effective volume control.

volume on a powerful station. This is an argument in favour of delicate volume-controlling, and of always working to minimums of volume and not to maximums.

A transmission which sounds quiet one moment may suddenly become much louder.

JARRING NOTES

HARSH noises heard during the reception of orchestral items are not necessarily due to distortion in the set. They might be present in the actual transmission.

Or it may be that the loudspeaker is causing something to vibrate in the room.

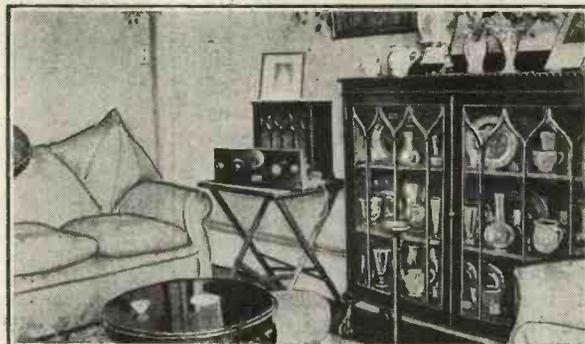
Ornaments on a mantelshelf, china and glass objects in a china cabinet (or even the glass panes of the cabinet itself), and fire-irons have all been known to vibrate and generate their own interfering sound waves.

Fill With Water

Sometimes such troubles can be overcome merely by shifting the position of the loudspeaker a trifle. At other times nothing short of filling the offending article, if it is a vessel, with water, or removing it altogether will cure it.

So don't overlook this possibility when you are worried by apparent distortion and can find nothing in your set which will account for the trouble.

PLAYING TUNES OF THEIR OWN !



Objects in a room may be made to vibrate by the loudspeaker and produce harsh, interfering sounds.



The MARCONIPHONE RADIOGRAM III

MODEL 330

A radio-gramophone combining all the attractive features of an essentially modern, sensitive and selective three-valve radio receiver with an electrical gramophone of

the highest order. Tested in the "M.W." Laboratories.

BY AN "M.W." TECHNICIAN.

IT was a happy thought that first sponsored the idea of combining radio and the gramophone. Half the beauty and attraction of being able to turn to the gramophone when the radio programmes fall is in being able to effect the change-over to all intents and purposes instantaneously.

Irrepressible Gaiety

A flick of a switch to take you from the gay and light-hearted revelry of the French to a wax impression of some lilting Hawaiian melody—or from the vastness of the Albert Hall with all its pomp and circumstance to the atmosphere of irrepressible gaiety often to be captured from a record of a West End dance band!

Contrast? Without a doubt! But isn't that the very essence of alternative entertainment?

This year more than ever before the makers have gone all out to popularise radio-grams, and they have set about it not by elaboration of cabinet or by the introduction of wrinkles to catch the eye, but by a method which is likely to have a much greater tonic effect—an all-round reduction in prices!

Many Fine Features

An outstanding example is to be found in the Marconiphone model 330, an instrument which, with its many fine features, is now available at the remarkably low price of 29 guineas. The "330," a model of which was recently submitted to us for test and report, is a radio-gramophone combining all the attractive features of an essentially modern, sensitive and selective three-valve radio receiver with an electrical gramophone of the highest order.

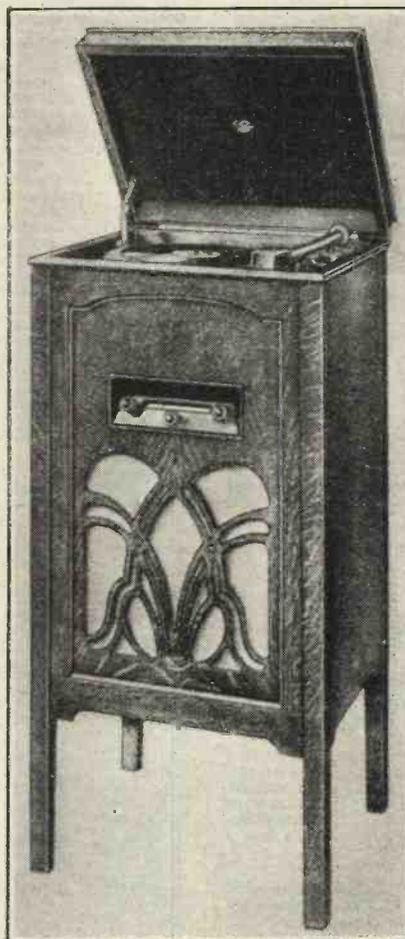
It is representative of rather more than just the instantaneous change-over ideal, for as a result of our tests there is not much room for doubt

that the "330" will provide alternatives on radio alone to suit every mood and whim!

But before we tell you any more about results, may we first give you an idea of the instrument itself?

The "330," which is available for A.C. or D.C. mains, is built into a

TRouble-FREE RADIO



The three knobs which you see on the front of the Marconiphone "330" control tuning, volume, wave-changing, on-off switching and radio-to-gram changing. No other controls are necessary.

simple but none the less attractive dark oak cabinet of pleasing appearance and design. On the radio side the circuit consists of a band-passed indirectly-heated S.G. H.F. valve, followed by a power grid detector and super-power pentode output.

Flood-Lit Scale

One of the attractive features at the front of the instrument is the Marconiphone duo-cyclic full-vision scale, flood-lighted and calibrated in wavelength.

There are only three knobs—located at the front of the instrument—by which to control all the various functions of the "330."

One of them takes care of tuning and enables you to select the pick of the programmes of Europe, another regulates volume on both radio and gramophone from a whisper up to an output adequate for all normal domestic requirements (and then some!), while the third operates a four-way switch giving medium waves, long waves, gramophone and off.

The gramophone part of the "330" consists of a slow-speed direct-drive electric motor with automatic stop, and a Marconiphone type 14 pick-up.

Now for a few more words about our tests. First of all, concerning consumption. The Marconiphone model "330" is, in our opinion, extremely economical, for our measurements show that the total consumption on A.C. is only 30 watts for radio alone, and 50 watts when the gramophone motor is running.

A High Standard

As for actual signal results, it would be a waste of time and space to attempt to give you a list of the stations we received on the "330." But what we do feel justified in mentioning is that but for the wavelength reading it would have been difficult with many of the distant stations to differentiate between them and the locals, so good was the quality and volume at which they were received.

The high standard of performance was equally in evidence during our record tests of the "330." The volume and quality obtainable from the wax impressions was as near a recreation of the living artiste as the present advanced state of the science can offer, and that is saying a lot.

Summed up, we are of the opinion that the "330" is an achievement of which the Marconiphone Company can justly be proud, and from the point of view of the reader we regard it as an instrument that is worthy of serious consideration.

FOR THE CONSTRUCTOR

A NEW SECTION
for
DISCRIMINATING SET BUILDERS

Including

THE MU-TONE THREE

A Self-contained and Inexpensive Radiogram with
MANY ORIGINAL FEATURES

MAKING YOUR OWN CABINET

The D.C. DIODION

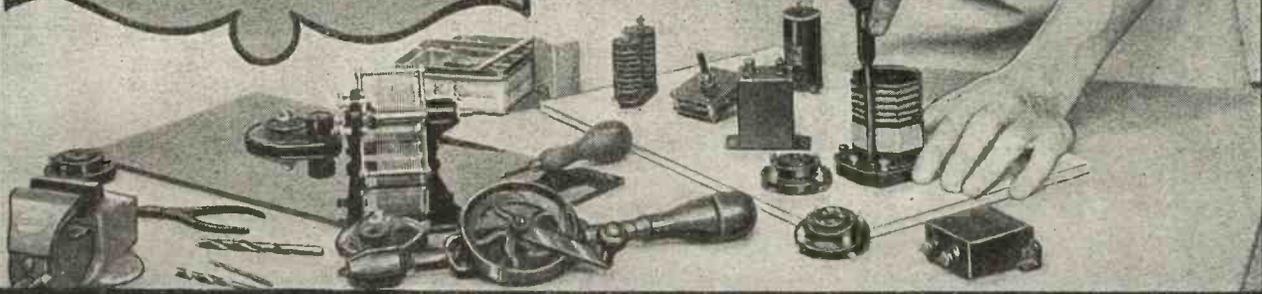
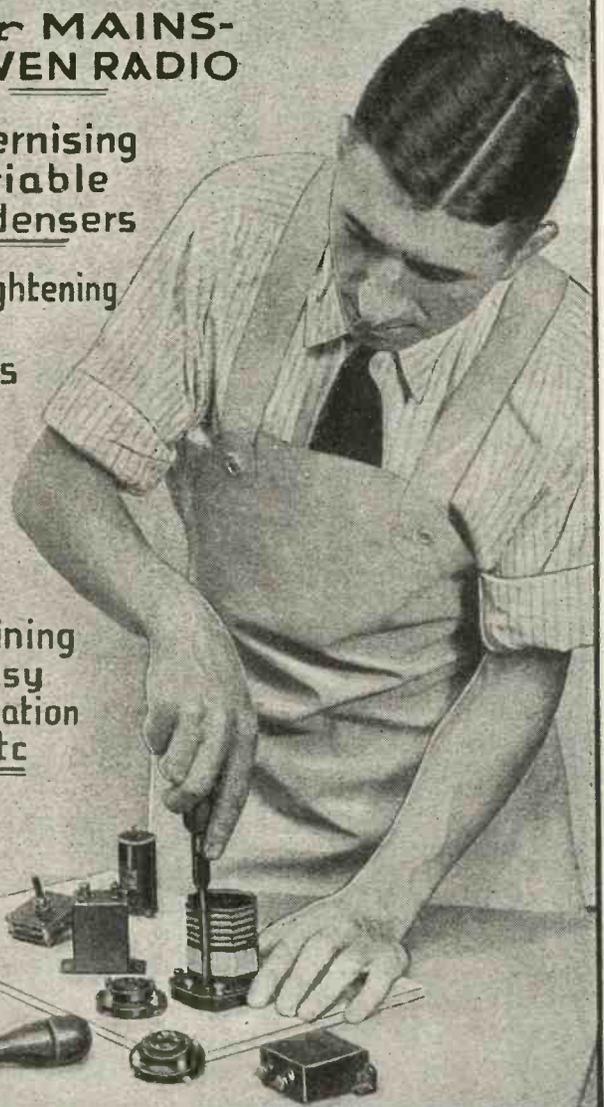
"MW's" LATEST
CIRCUIT SUCCESS

for **MAINS-DRIVEN RADIO**

Modernising
Variable
Condensers

Straightening
Blue
Prints

Obtaining
Easy
Oscillation
etc





Introduction

THE radio-gramophone is the logical combination of two excellent forms of home entertainment—the radio receiver and the gramophone. Both of these instruments are capable of providing endless enjoyment in the form of musical or other aural diversion, and the harnessing of the valve to the recording and reproduction of records as well as the operation of radio sets makes the manufacture of a combined radio and gramophone reproducer a comparatively easy matter.

THUS we find that this year an increased amount of interest is being displayed in the radio-gramophone, for it is becoming widely recognised that this type of instrument is not only an efficient radio receiver, but also a really good record reproducer.

MANY advances in the design of valves and in radio and audio amplification have assisted in making it possible to obtain a remarkable degree of realism in the outputs of these instruments. Mains operation in a radio-gramophone is a great advantage, and the owner of a house with electric light supply would do well to consider the advantages of the combination instrument when thinking of getting or building a new radio receiver.

THE radio-gramophone, therefore, is undoubtedly the finest home entertainer yet devised; it is a never failing source of enjoyment, with practically unlimited capabilities in the provision of amusement.

WITH such a receiver one is never without a programme, either of radio or record, and the amount of enjoyment that can be obtained is in no small measure due to the fact that one can have music whenever desired. There is no waiting for the B.B.C. or some other broadcasting organisation to start operations; the set can be switched on at any time with full knowledge that some really good entertainment will follow.

Variable Tone Control

is the chief feature of this three-valve A. C. mains radio-gram, which incorporates in addition:

Variable-mu H.F. Stage

This enables volume to be controlled without introducing cross-modulation troubles by varying the bias on the S.G.'s grid.

Band-Pass Tuning

A "flat-topped" tuning scheme that gives a high degree of selectivity without high-note loss.

Power-Grid Detection

With this arrangement there is no possibility of overloading the detector stage on strong transmissions.

Super-Power Output Valve

This is of the indirectly-heated type capable of providing an undistorted output of 1,000 milliwatts, which is more than sufficient for even the largest room.



The MU- TONE Three

Advantages:

WE have pointed out the advantages of the radio-gramophone in general, now it remains for us to introduce the particular model of this popular instrument to be described in these pages.

It has been argued that it is better to buy than to make an all-electric radio-gram, owing to the fact that there is not much difference in the cost, and that a better finish can thereby be obtained. This is not strictly true if one is to take into consideration the technical feature of the two types of instruments, for as a general rule one can build a receiver that is just as good to look at, but has the very great advantage over the bought model in that it contains

the results of the very latest research work in both the radio and the gramophone spheres.

These new refinements can usually be included at no—or little—extra cost in the design of the instrument, and immediately make it right-up-to-the-minute in conception.

The "Mu-Tone" Three incorporates all the most recent advances in radio receiver design, including the variable-mu screened-grid valve and variable tone control. These are both of great importance because they provide not only perfect volume control in the case of radio reception, but also true tone correction on the audio-frequency side.

Thus whether one is listening on radio or gramophone, the balance of tone can be adjusted to suit the item being played, and also the elimination of much of the present-day heterodyne interference can be accomplished by the same method.

This latter is a strong feature, for it is undeniably, though unfortunately, a fact, that up to the present time the chaotic state of the European ether has set a difficult problem to set designers. Heterodyne whistles are not easy to get rid of, and the best method to cope with all the various frequencies encountered is undoubtedly that employed in the "Mu-Tone" Three.

The MU-TONE CIRCUIT

THE circuit of the "Mu-Tone" Three is particularly interesting owing to the novel features that it contains. We have already said that variable-mu screened-grid-valve amplification and variable tone control are incorporated in the set, but the circuit reveals features of design that go farther than those.

Band-Pass Tuning

Let us work through the circuit point by point from the aerial end. In the first place we have a band-pass aerial tuning arrangement which gives both good selectivity and good quality. Next we have the screened-grid valve, which, as already

stated, is of the variable-mu type.

This is controlled by means of the potentiometer system, which comes in series with the cathode earth lead when the set is used on radio. It is placed in or out of circuit by the double-throw switch shown near the detector valve in the diagram. This switch also controls the radio-gramophone section, so that with the switch in one position radio is the order of the day, and with it in the other the set is a gramophone.

Changing Over

When the receiver is set for record reproduction the switch disconnects the slider

of the potentiometer from the cathode circuit of the screened-grid valve and connects it to the grid of the detector valve. The ends of the potentiometer are permanently connected one to the earth of the set, and one to a pick-up terminal via a condenser.

One Control

Thus on radio the pick-up has no effect on the S.G. stage, while on gramophone the cathode circuit of the S.G. valve is broken and the valve is rendered inoperative. This enables the same volume control to be used for radio or gramophone without having to use inefficient control on either.

At the Input

In each case the control is carried out at the input of the energy, where it ought to be; and though it could have been arranged in the L.F. end with one control, it would not have been nearly so satisfactory.

From the screened-grid stage we go via a tuned-anode shunt-fed system to the detector. This, we have already explained, is the

place where the radio-gramophone switching takes place, the valve being automatically biased when the pick-up is being used, and operating on the leaky-grid principle when employed as a detector.

It is shunt-fed transformer-coupled to the power stage by means of one of the new "Multitone" transformers, which allow tone correction to be employed.

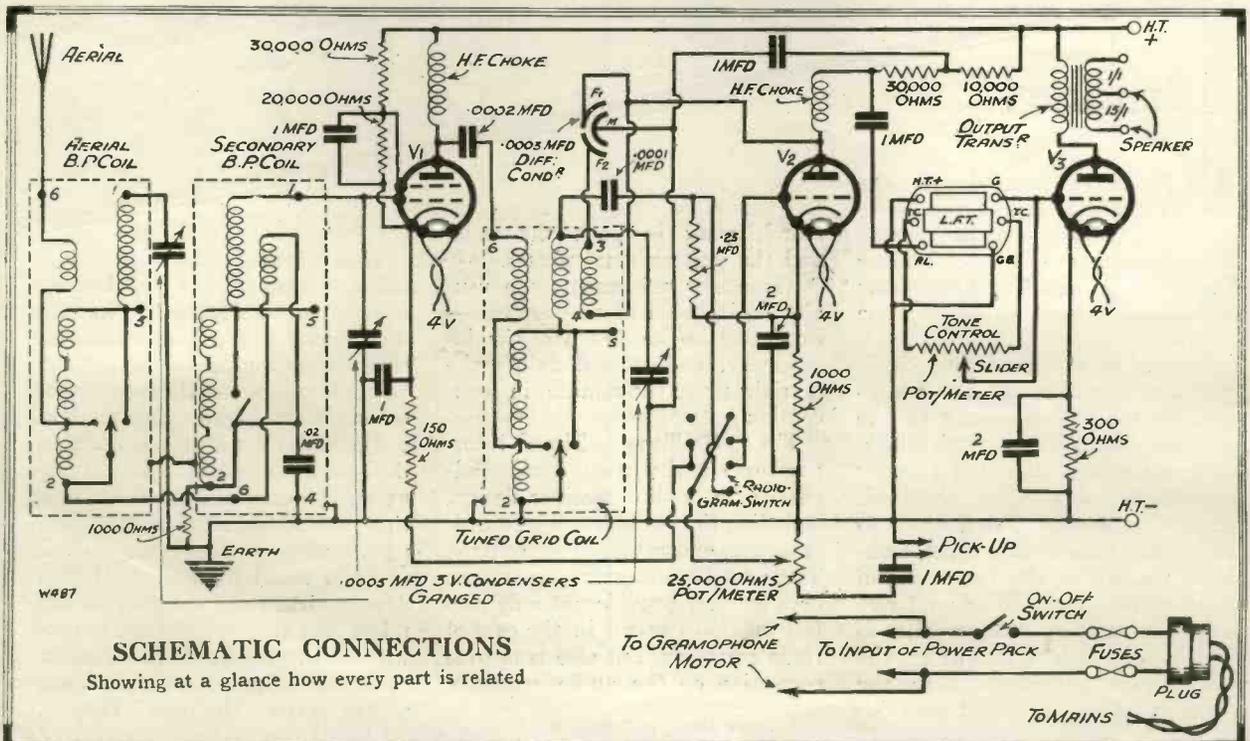
Tone Variation

By means of the potentiometer across special terminals on the transformer the amplification curve of the component can be varied from a fairly straight one giving no particular prominence to any frequency until it gives a decided lift at either the bass or the treble end of the musical scale.

Increasing Low Notes

Thus to increase the low notes we turn the potentiometer in one direction and the high-note amplification is considerably cut down, giving a preponderance of low-frequency. On the other hand, if it is more high notes

(Continued on page 330.)



SCHEMATIC CONNECTIONS
Showing at a glance how every part is related

BUY THESE PARTS AND BUILD THE "MU-TONE" THREE

PANEL
See text.

CABINET

- 1 Camco Gresham radio-gram.

COILS AND CHOKES

- 1 triple-gang assembly (Varley aerial band-pass, sec. band-pass, and tuned-grid coils).
- 2 H.F. chokes, one flat type (Peto-Scott, Lewcos, Telsen, Ready Radio, Lissen, Tunewell, Slektun, Wearite, Varley, R.I.).

CONDENSERS

- 1 triple-gang .0005-mfd. variable (Utility, Polar type A).
- 1 differential reaction, .0003 to .00035 mfd. (Telsen, Ready Radio, Keystone, Polar, J.B., Cyldon, Lotus, Lissen, Ormond).
- 1 .0002-mfd. fixed (Dubilier type 665).
- 1 .0001-mfd. fixed (Telsen, T.C.C., Lissen, Dubilier, Sovereign, Goltone, Ready Radio).
- 2 1-mfd. fixed (Dubilier type 9200).
- 1 1-mfd. (Dubilier type BB).

- 2 1-mfd. (T.C.C., Telsen, Dubilier, Igranic, Sovereign, Ferranti, Formo, Peto-Scott).
- 2 2-mfd. (Telsen, Dubilier, etc.).

VALVE HOLDERS

- 3 5-pin (Lissen, Telsen, W.B., Benjamin, Tunewell, Ready Radio, Bulgin, Clix, Lotus).

RESISTANCES

- Bias resistances of the detector and power valves will vary according to the valves used (see separate list). (Makes in set are Dubilier and Wearite.)
Other resistances are as follow:
- 1 10,000-ohm (Dubilier, Graham Farish Ohmite, Igranic, Wearite).
 - 1 25,000-ohm potentiometer (Wearite).
 - 1 20,000-ohm resistance (Graham Farish Ohmite, Dubilier, Igranic, Wearite).
 - 2 30,000-ohm resistances (Dubilier, Graham Farish, etc.).
 - 1 1,000-ohm resistance (Graham Farish Ohmite, etc.).

- 1 250,000-ohm grid leak with tags (Lissen, Graham Farish, Igranic, Dubilier).
- 1 Multitone control potentiometer.

L.F. TRANSFORMERS

- 1 Multitone.
- 1 output transformer (Ferranti O.P.M.S. see text).

MISCELLANEOUS

- 1 on-off rotary snap switch (Ready Radio Bulgin, Tunewell).
- 1 D.P.D.T. rotary switch (Wearite 32 without terminals).
- 2 baseboard brackets 3 1/2 in. high, and two 1 1/2 in. high (Wearite).
- 3 7-in. lengths of 3/8 th rod with 1 metal and 1 ebonite coupling links for 3/8 th spindles, and 1 stepped coupling link 3/8 th and 1/2 in. for reaction condenser. These rods should also have panel bushes.
- 2 terminals (Bulgin, Belling & Lee, Clix, Igranic, Goltone, etc.).
- 1 mains plug adaptor (Bulgin, Goltone).
- 1 pair fuses (1 amp.) (Belling & Lee).

ON this page you will find the list of components and such alternatives as can be used instead of the original makes should it be desired to substitute. Substitution is always a risky game unless it is clearly understood that those alternatives mentioned in the list of components, and those only, are really recommended as suitable for the set in question.

Best Method

In most cases it is far easier and more satisfactory to keep rigidly to the list of original components. Substitution means, as a rule, that certain of the leads in the set will have to be altered in length and in position, and this may, if not carefully carried out, result in upsetting the operation of the receiver.

In the "Mu-Tone" Three many of the components cannot be substituted without redesigning the set, and where no alternative components are given in the list no attempt should be made to use other than the make and type specified.

Vital Items

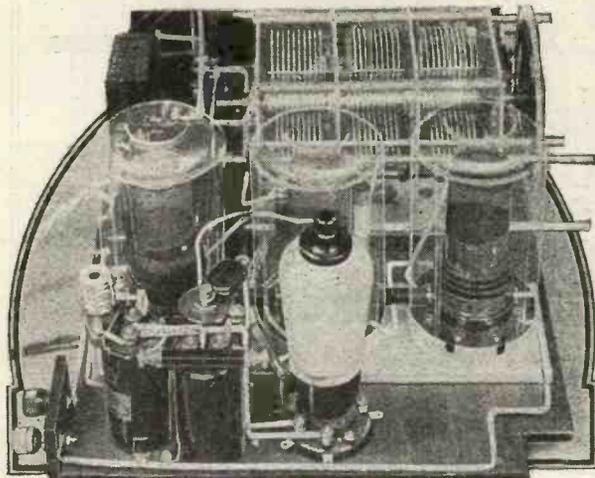
Cases in point are the ganged condenser, where size is a consideration, for the set is fairly well packed in; the ganged coils, which are of specially chosen type; the L.F. transformer, which is specified for a particular task, one for which it is specially designed; the tone-

control potentiometer, which is supplied with the transformer, if required, and for which it is only too easy to substitute an unsuitable one; and so on.

It will be noticed from the photographs, as well as from the list of components, that some of the fixed condensers are of the particularly convenient small, flat type,

being fixed in position by means of the eyes in their tags, which are placed over terminals of various components. This system of fixing obviates wiring, and serves to make the set more compact and efficient. It does not stop the use of ordinary condensers with terminals in such cases, but readers will realise that the

THE VARIABLE-MU IN ACTION



The S.G. valve is of the variable-mu type, which enables full control of volume to be obtained without upsetting the working of the valve.

tag type are very much more convenient, and it is an advantage to stick to them where specified.

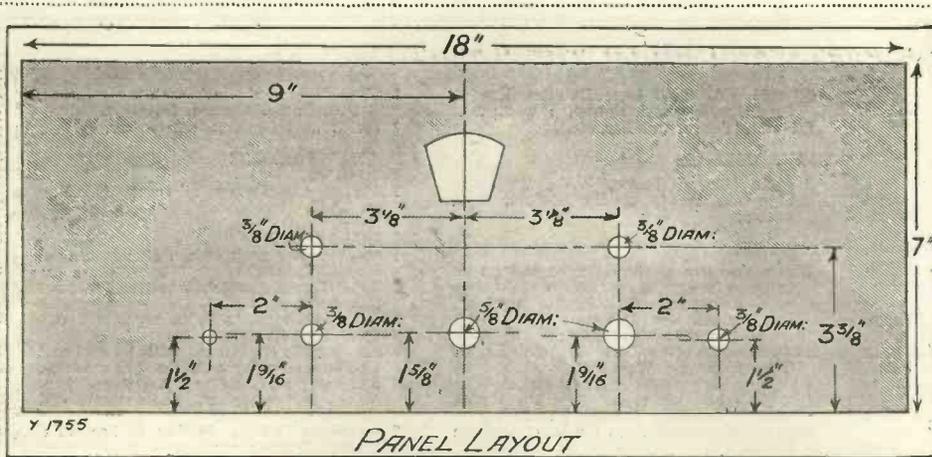
More Convenient

It is convenient, too, to have resistances that can be mounted direct on short lengths of wire rather than having to be fixed by means of special holders. Again, this is not essential, but merely adds to the convenience of the construction.

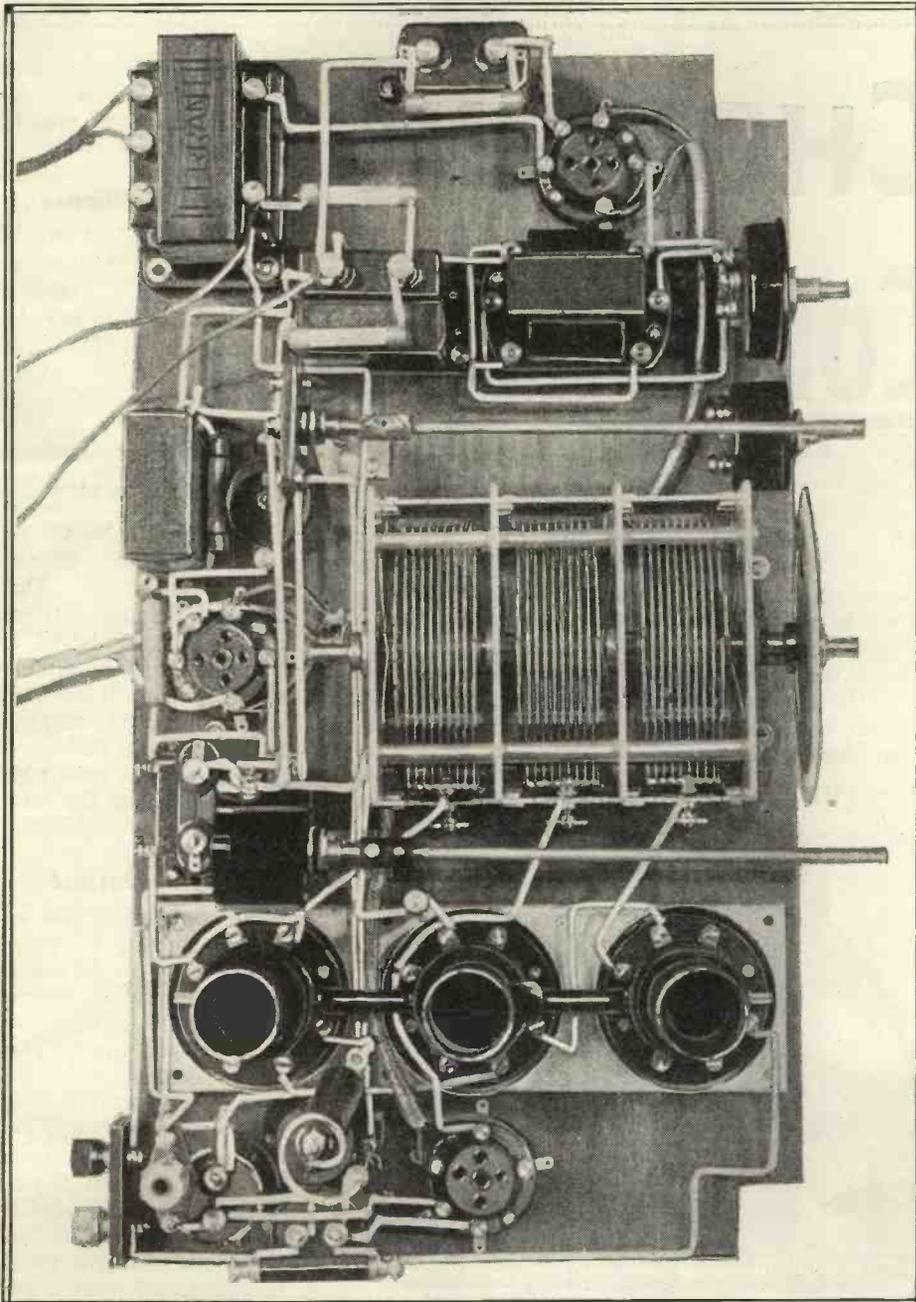
It will be noted that only two terminals are used in the construction of the set; other than those on components, of course. These are for aerial and earth connection. The loudspeaker is connected to the terminals of the output transformer, while the power supply is fed by means of leads direct from the mains unit, which is housed below the set in the radio-gram cabinet.

The Output

A word might be said here concerning the output transformer. In the original set is shown a Ferranti transformer having two ratios, 15 and 1 to 1. These are chosen as typical ratios for loudspeakers of the low-resistance moving-coil type and of the high-resistance balanced-armature type. With this transformer either speaker could be used. Some people may prefer to use the special transformer recommended by the makers of the particular loudspeaker



PANEL LAYOUT



A neat and businesslike appearance is one of the features of this fine set.

they choose, and, of course, this will be quite in order. The one chosen by the Research Department was taken as a typical good make for the guidance of those who had no particular fancy.

THE "MU-TONE" CIRCUIT

—continued from page 328

that we require the potentiometer control is turned in the reverse direction and the bass is reduced, giving a balance in favour of the high audio-frequencies.

As previously explained, this is particularly useful when dealing with record reproduction, for it permits compensation of tonal balance to allow for non-linear characteristics in record, pick-up, or speaker.

Output Transformer

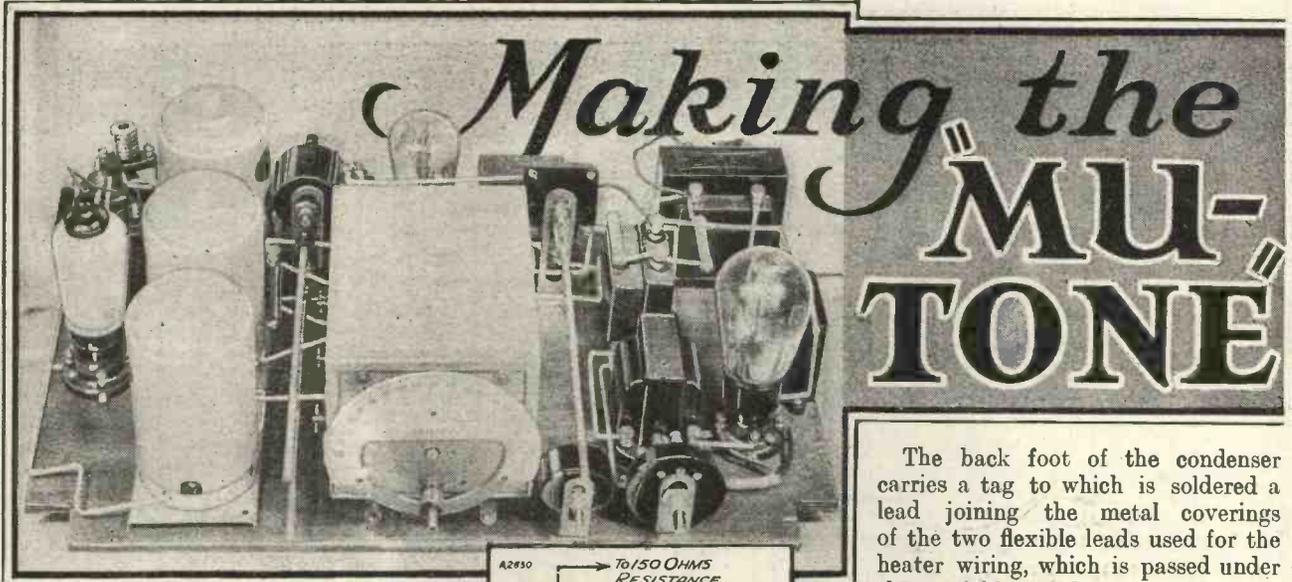
From the transformer we go to the last valve, which is one of the high mutual-conductance types having an output of round about 1,000 milliwatts. This is transformer-coupled to the loudspeaker, the ratio of the transformer being chosen so that the valve and loudspeaker are matched. In the particular model of the "Mu-Tone" Three described here the loudspeaker was an Epoch Model 99, and either the X or the K type can be used.

The former is a little more sensitive than the latter, but both gave excellent results. In either case the No. 8 diaphragm was employed.

The Power Pack

A separate power-pack is employed with the "Mu-Tone" Three, making the construction particularly easy.

Decoupling is carried out in the anode circuit of the detector valve, while the somewhat elaborate potentiometer H.T. feed system to the screening-grid of the variable-mu valve effectively decouples this section.



Making the MU-TONE

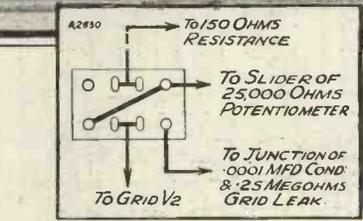
THE actual construction of the "Mu-Tone" radio-gramophone is not really difficult, though it needs a certain amount of care. It is designed, of course, to fit a particular make and type of cabinet, and though it could be adapted to suit another it is strongly advised that such adaptation shall not be undertaken. In the list of components it will be seen that the Camco Gresham cabinet is specified, and the baseboard of the set is so cut that it exactly fits this. The baseboard is the first thing that has to be prepared, and this should be cut at the corners as shown at the top of this page in order that it may fit properly round the uprights of the cabinet.

Mounted on Brackets

The back upright on either side is cut away for the thickness of the baseboard to allow the latter to slide in on the two fillets along the sides of the cabinet. These fillets have to be fitted; they are not supplied as a rule with the cabinet. This is not a difficult task, however, and two pieces of wood, 1½ in. by 15 9/16 in. long, are required. They are fixed along the sides of the cabinet at a height of 11 1/8 in. from the inside of the base.

On these fillets the baseboard slides, and after this bit of fixing has been done the baseboard can be removed and the construction of the set commenced.

As regards the "panel components," these are mounted on brackets so that they can be self-supporting and the set can be slid into the cabinet and out at will. Actually, it is a good plan to make a thin panel of



plywood for use while the set is being built; it can afterwards be thrown away. This method makes it very much easier and it also helps when the drilling of the face of the cabinet has to be done, the removed wooden panel being used as a template. The panel should, of course, be cut the same length as the baseboard less the two bits cut out to clear the cabinet uprights.

For this reason we give a panel diagram, although in the true sense of the word there is no panel. The variable condenser is mounted on its own feet on the baseboard, and with the exception of this and the coil assembly unit all the "panel components" are mounted on metal brackets of the type that allow adjustment for height.

The Dummy Panel

Care must be taken in laying out the baseboard after the dummy panel has been drilled, for there is not much room to spare and the relative positions of the various components play a large part in the ease with which the set can be wired and the eventual success in action. Note how such small parts as the grid leaks, bias resistances, fixed condensers, and so on, are fixed in relation to the rest of the components, for all the positions have been most carefully thought out so that the design can be as compact and as efficient as possible.

The back foot of the condenser carries a tag to which is soldered a lead joining the metal coverings of the two flexible leads used for the heater wiring, which is passed under the variable condenser.

Note also the tag on the frame of the coil unit, which is connected to the earth terminal of the set and other earthed points. No copper foil is used. No metal foil is used on the baseboard of the set, so that all the earthed points have to be carefully made to other points eventually going to earth and H.T. —, and care should be taken that none of these points is missed.

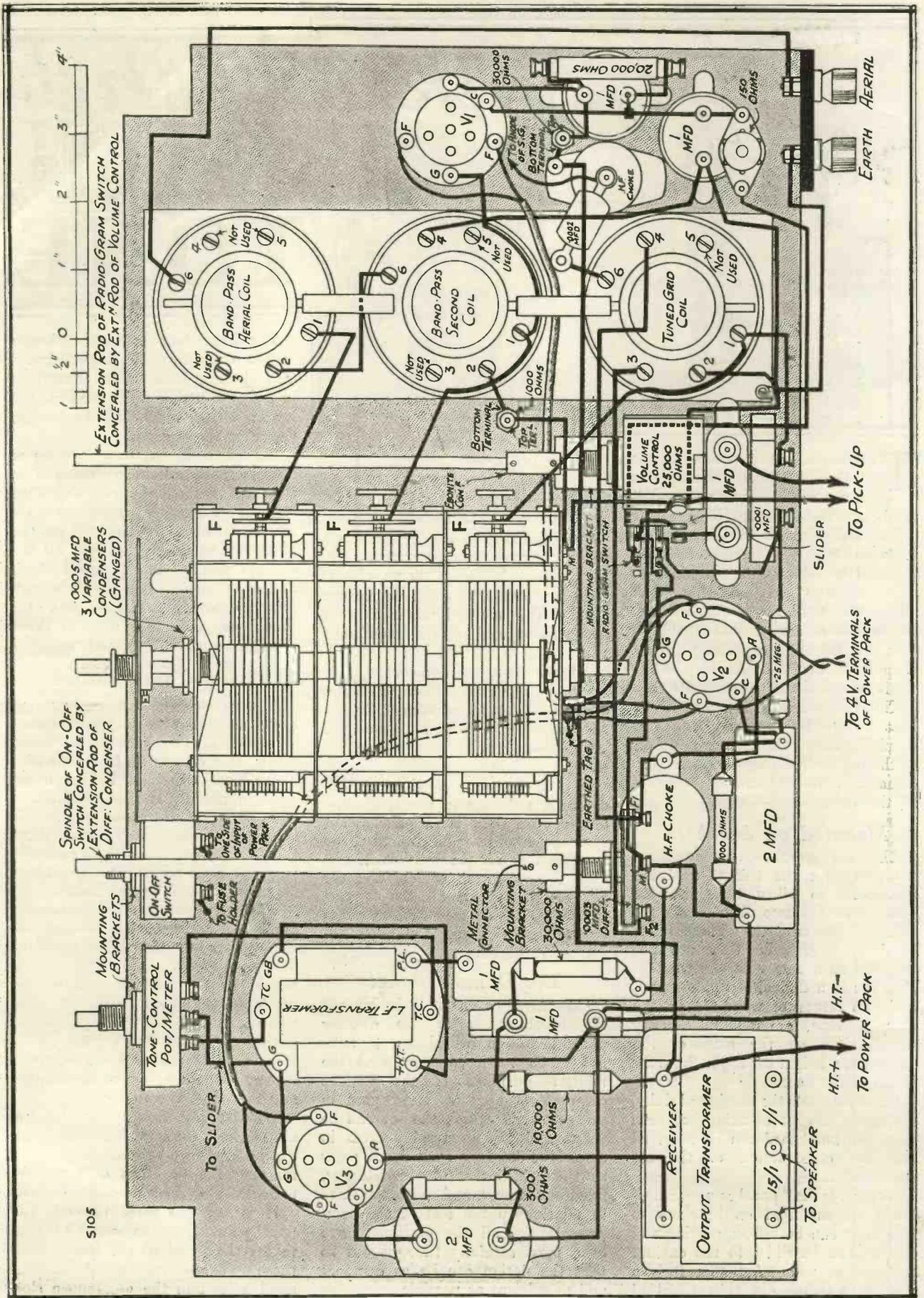
Double-Throw Switch

A separate diagram is provided above showing the wiring of the radio-gram switch. This component comes below the volume-control potentiometer, and so is rather hidden in the main diagram. It is, however, a plain type of double-throw switch of well-known variety, and there should not be a difficulty in connecting the various points if the secondary diagram is carefully studied.

With the set constructed the dummy panel can be removed, leaving the components in their relative positions on the brackets. The panel is now placed in the cabinet against the inside of the front, with the ends against the cabinet uprights and its bottom edge flush with the two fillets. It is now in the position it would occupy if the set were in the cabinet and the panel were left on.

With careful fixing and with the aid of check measurements the panel can be used as a sort of template for marking the positions of the holes to be drilled in the front of the cabinet.

It is best to mark through the panel points from the back, and then, taking the panel to the front, check these up before drilling out the full-sized holes and the escutcheon slot.



Accessories for the "MU-TONE"

THE accessories for the "Mu-Tone" Three are necessarily restricted in variety, for with the exception of valves and loudspeaker there is little that can be altered from the original specification of the set.

The loudspeaker should be chosen with care, as naturally the better the speaker the better the results that are likely to be had from the set, though it must be admitted that the cost of this part of the radio-gram must be taken into account, and according to price will the results depend to a certain extent.

In the original set we have used the Epoch 99K loud-speaker chassis, though the 99X will do excellently and is a little more sensitive. Other makes of permanent-magnet loud-speaker can be used as desired, and, as before stated, their particular output transformers can be substituted for that in the set if required.

The mains unit should not be substituted, but there is a fairly

ALL THESE ARE GOOD

Loudspeaker. Epoch 99K or 99X, Ferranti, Celestion, W.B., Blue Spot, Lanchester, R. & A., Marconiphone, in chassis form, permanent-magnet type.

Pick-up. British Radiophone, Marconi, Audak; Bowyer Lowe, Celestion, Bulgin, Blue Spot, Varley.

Gramophone Motor. B.T.H. Synchra Blue, Simpsons, Garrard A.C. motor.

Mains Pack. Heayberd "Popular."

Aerial and Earth Equipment. Electron "Superial"; Graham Farish "Filt" Earthing Device.

wide choice of valves, provided those that are mentioned in the list on page 335 are used. It is important to note that whenever a valve type is changed, it is necessary to alter the automatic bias resistance value, and for this reason we give with the list of valves the corresponding bias resistances required.

With regard to the gramophone motor, as long as an A.C. motor of good design is employed, any type can be used here. It is convenient, however, to employ a synchronous type such as that used, as this cuts down the expense and greatly simplifies the fitting, there being no speed-regulating control to fit. The hole made in the motor-board for the motor is quite easily cut with a key-saw, and full dimensions and directions for the fitting of the motor are given with the instrument.

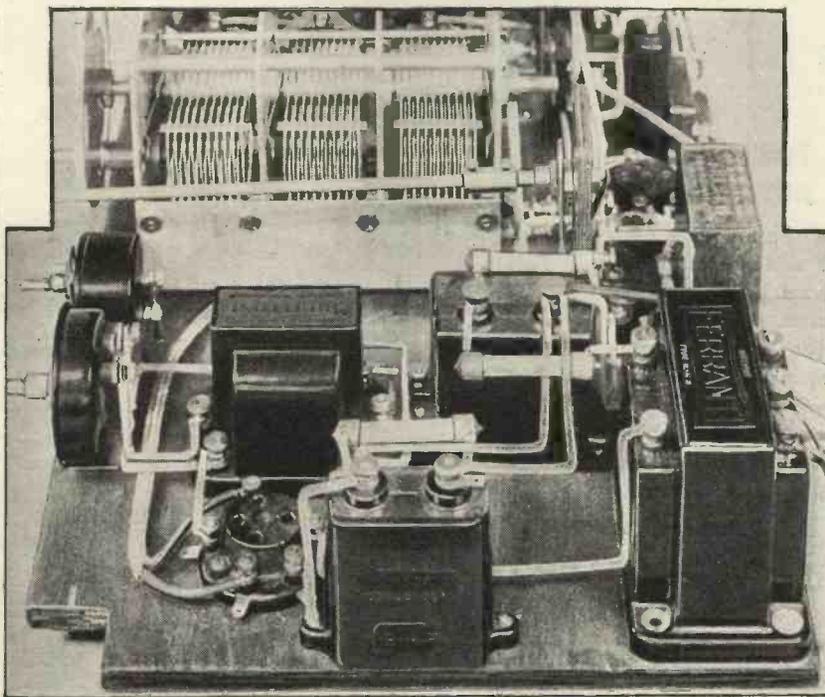
FITTING THE ACCESSORIES

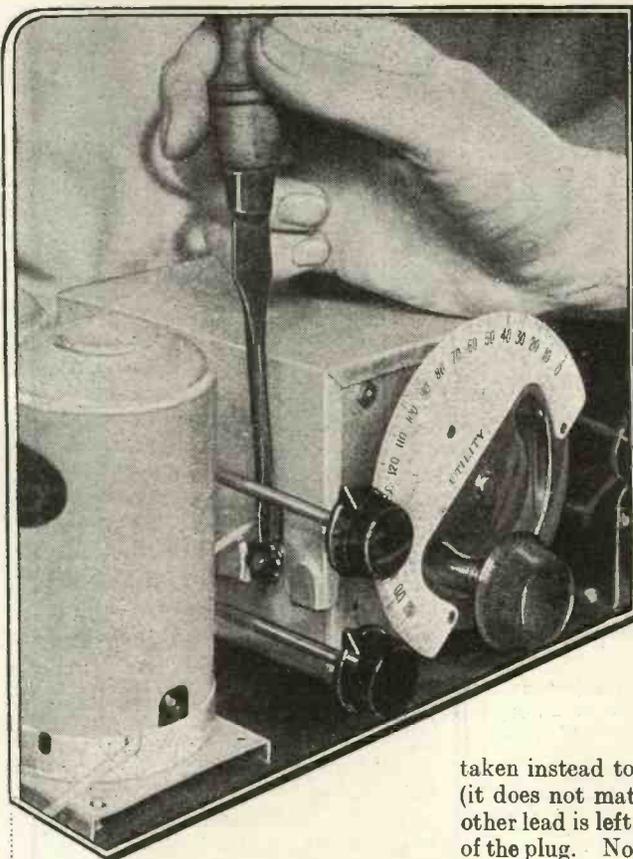
Gramophone Motor. The fixing of the motor need present no difficulty to the constructor. The makers provide full details and instructions with the apparatus, and, with the simplest of tools, the task is an easy one.

Loudspeaker. The speaker is first fixed in the ordinary way to a small baffle, and this, in turn, is screwed to the back of the fret, making sure that the speaker is central with the fret.

Mains Unit. The mains unit is placed on the floor of the cabinet behind the speaker. Leads, kept as short as possible, connect it to the set up above.

The L.F. end of the set includes a special control which allows any desired tone-volume to be obtained at will.





"The MU-TONE" in Action

This lead is to be one of the two twisted flex wires that run from the adaptor plug to the mains unit. In other words, the plug is disconnected from one of the leads and the lead is

taken instead to one side of the switch (it does not matter which side). The other lead is left connected to one side of the plug. Now replace the removed lead by one of suitable length from the remaining side of the switch to the vacant side of the plug. This is all that has to be done, it being remembered all the time that the lengths of flex used must be sufficient to

reach the electric light supply point.

This done, the next step is to connect the electric gramophone motor.

The two leads from the electric motor are connected in parallel with the input leads of the power pack. The connections should be carefully covered with insulating tape.

High-Tension Connections

The output side of the mains unit requires only a few leads. The heater wiring we have mentioned; the high-tension connections are these: H.T.— on the unit is connected to the lead marked H.T.— on the wiring diagram, H.T.+ goes to the lead suitably marked, and then H.T.— and one of the heater terminals of the unit are joined at the unit.

Which of the heater terminals is chosen depends upon circumstances.

THE assembly of the "Mu-Tone" Three when the set has been built is not difficult, for the power pack chosen is one that is very easily connected, and the leads to the set are kept to a minimum.

We are assuming that the electric motor has been fixed in the motor-board, and that one or other of the pick-ups mentioned in the list of accessories has been chosen and suitably fixed in position.

The heater connections from the mains unit are taken to the two filament terminals of the detector valve-holder, while the input power lead to the unit is split as follows.

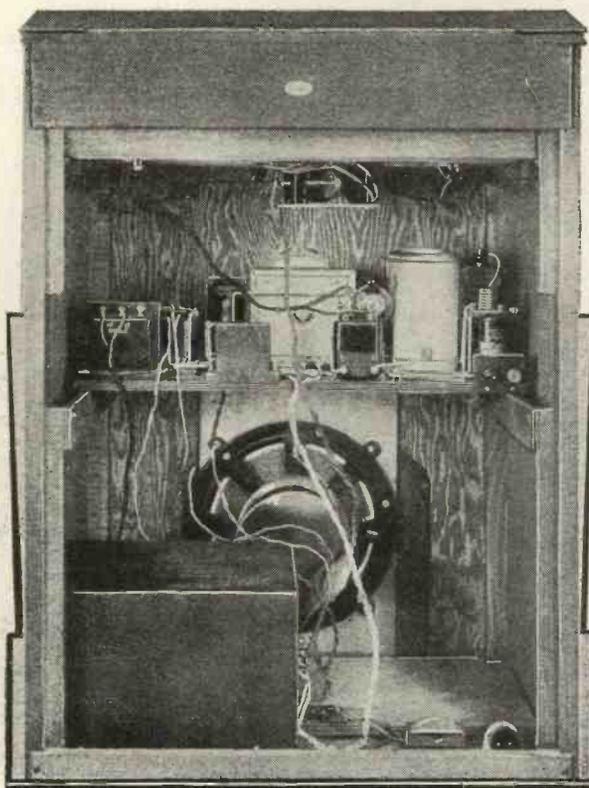
Wiring the Switch

As supplied by the manufacturers, the power pack has a long, flexible lead coming from it, terminating in an adaptor plug. This plug is for insertion in the electric light supply, but the lead to the unit must be modified a bit before the set can be placed in commission.

The set and the mains unit should be placed roughly in position in the cabinet, the former on the top shelf and the latter behind the loudspeaker on the bottom. Then it will be seen what length of wire is required to reach from the mains unit to the on-off switch on the panel of the set.

POWER-PACK ADVANTAGES

A separate power pack is used with the radio-gram. This arrangement has the advantage that all the mains equipment is kept well away from the set, so reducing the chances of trouble from hum to a minimum.



THE "MU-TONE" IN ACTION—continued

It should be tried first on one and then on the other, the set being operated in the meantime, and then the terminal should be chosen with which the least hum (if any) is heard.

Ready for Test

The loudspeaker is joined to the appropriate output terminal on the output transformer; if the Ferranti transformer is used it will be the 15/1 when a low-resistance moving-coil speaker is employed. If the special transformer belonging to the speaker

valve, while in the record position the control is anti-clockwise.

After the pick-up test we turn to radio. The switch is placed in the opposite position, and we are ready to tune in some station or other. The wave-change switch on the coil unit is turned right to medium waves, and we search for the nearest "local."

Trim the Condenser

After hearing it we try a more distant programme, and then proceed to trim the variable condenser. This is best done by varying the two trimmers nearest the panel, and leaving the end one set at somewhere

the musical range. It adjusts for pick-up and record delinquencies, and assists in getting rid of heterodyne whistles on the radio side.

It is invaluable when listening to speech on the radio, for, as everyone knows, the soft speech tones as spoken into a nearby microphone do not sound so natural when amplified up to loud-speaker volume in the drawing-room.

There is one point that perhaps may have puzzled the reader of this article, and that concerns the why and wherefore of the insulated collar on the extension rod of the volume control, whereas the collars on the other rods are of metal.

Reasons for Insulation

It is advisable to insulate the spindle of the volume control from the long rod, because this latter goes along near the high potential connections of three tuned circuits. The spindle of the potentiometer is connected to the anode circuit of the S.G. valve (in the cathode lead) while the set is on radio, and this might quite easily cause feedback if the spindle were taken uninsulated near those wires.

This is an excellent example of the importance of apparently small details. It is never safe to think that the designer has made a mistake when anything out of the ordinary is noticed!

RECOMMENDED VALVES

Make.	S.G.	Bias Res.	Det.	Bias Res.	L.F.	Bias Res.
Mullard	—	—	354V.	1,000	104V.	1,000
Mazda	A.C./S.1V M.	150	A.C./H.L.	1,000	A.C./P.	750
Cossor	—	—	41 M.H.F.	1,000	41 M.P.	320
Marconi	—	—	M.H.4	600	M.L.4	350
Osram	—	—	M.H.4	600	M.L.4	400
Tungsram	—	—	A.R.4101	600	A.P.495	1,000
Eta	—	—	D.W.4023	800	—	—
Six-Sixty	—	—	4G.P.A.C.	1,000	4S.P.A.C.	1,600
Lissen	—	—	A.C./H.L.	500	—	—

NOTE: Many of the above makers have variable-mu valves, but any change from the make specified in the original set might necessitate a comparatively large change in component values and in the S.G. screen circuit.

is used then you must go by the makers' instructions.

The pick-up is connected permanently to the two points so marked on the wiring diagram, and with aerial and earth duly joined the set is ready to test.

It is not a bad plan to carry out the first test on records, and so we will put a record on the turntable, turn the radio-gram switch to the left, start the motor, and putting a needle in the pick-up we lower it carefully on the edge of the record and off we go.

A Different Task

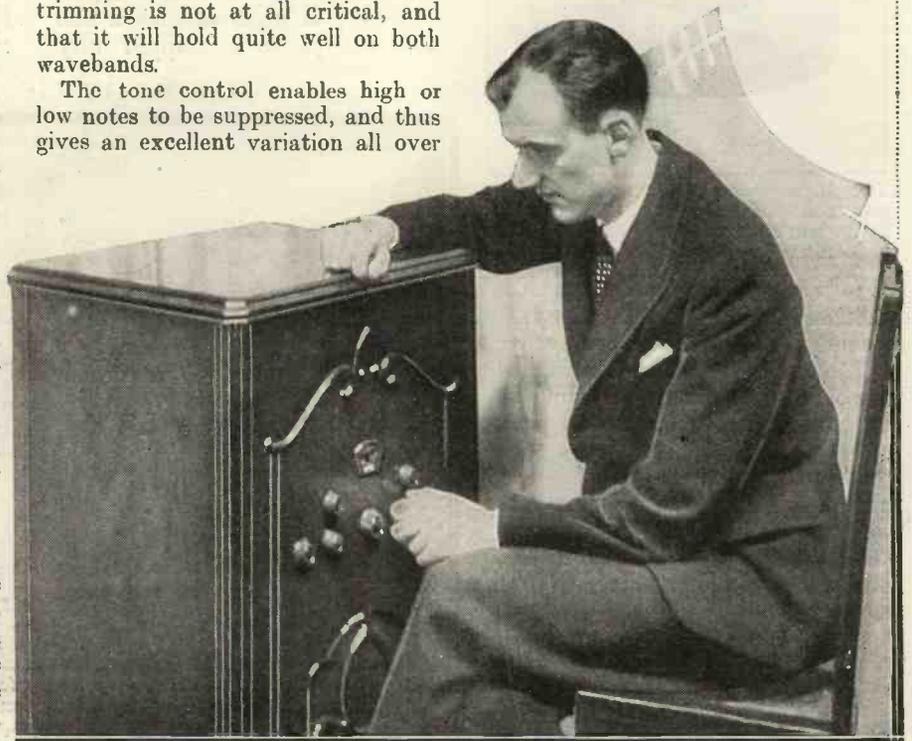
The gramophone motor is started after switching on by giving it a swing in a clockwise direction, after which it will keep the correct speed (provided your electric mains are 50-cycle; if not, you will need a different motor, to suit the periodicity of the mains).

The volume control, it will be found, operates in the reverse direction from usual, for this controls volume on record or radio, doing quite a different task in each case. Thus in the radio position it operates in the normal direction, as it controls the mutual conductance of the S.G.

near maximum. Probably the aerial trimmer will have to be nearly out.

Trim on some low-wave station at first, and then check up on the higher waves, and on the long-range band. It will be found that the trimming is not at all critical, and that it will hold quite well on both wavebands.

The tone control enables high or low notes to be suppressed, and thus gives an excellent variation all over



SOLVING YOUR PROBLEMS

Simply applied remedies for little troubles which continually crop up, even in the best constructional circles.

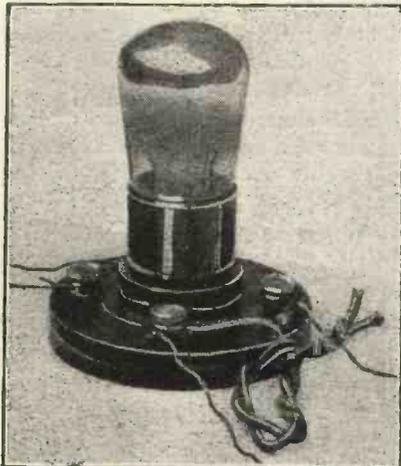
OBTAINING EASY OSCILLATION

You may have noticed that a particular valve of yours sometimes proves extraordinarily difficult to throw into a state of oscillation on certain wavelengths. Such a fact may be due to certain internal peculiarities of the valve, and it may prove to be rather an annoying trouble at times.

A good tip for overcoming this difficulty is the following one.

Cut two single pieces of flex, each about three or four inches in length, and connect these to the grid and plate leads of the valve.

ADDITIONAL CAPACITY



Two single pieces of flex connected to the grid and plate terminals of the valve-holder will often enable a "difficult" valve to oscillate readily on all wavelengths.

Do not connect the free ends of the flex together, of course, for that would mean short-circuiting the valve.

The two pieces of flex are twisted together tightly, and then bound up in that position by means of a piece of cotton.

They form a miniature condenser, and, owing to the additional capacity which they impart, they will generally enable the valve to oscillate readily over the wavelength range of the receiver.

MODERNISING VARIABLE CONDENSERS

Many of the older types of variable condenser are very soundly con-

structed and are quite suitable for incorporation in modern receivers, but for the fact that they are sometimes apt to be exceedingly noisy in use.

This is especially noticeable if one tries to use them in a short-wave receiver, and is due to their relying on a rubbing contact between the rotor plates and terminal, instead of making use of a pigtail connection. For this reason, amateurs possessing one or more of these condensers often wish to fit such a contact, but find a difficulty in fixing the pigtail to the rotor, as soldering to this is apt to prove a difficult job.

The following tip will be useful in cases where this trouble is experienced.

A small strip of brass or copper, whose length depends on the diameter of the condenser spindle, is cut, and a hole drilled in each end. This is then shaped into a circular clip, fitted round the condenser spindle in a suitable position, and fixed by means of a small nut and bolt through the two holes.

The clip is made of such a size that the spindle is gripped very

firmly when the nut is screwed down. A soldering tag is slipped on to the bolt before tightening up, and the pigtail, which can consist of a short length of good quality rubber-covered flex, is soldered to this.

An excellent contact between pigtail and rotor will then result, and an old and otherwise useless condenser takes on a new lease of life.

STRAIGHTENING YOUR BLUEPRINTS

Once a blueprint has been rolled up for any length of time it is often a very difficult matter to get it to lie flat on a table or work-bench. Rolling in the opposite direction is not much of a cure.

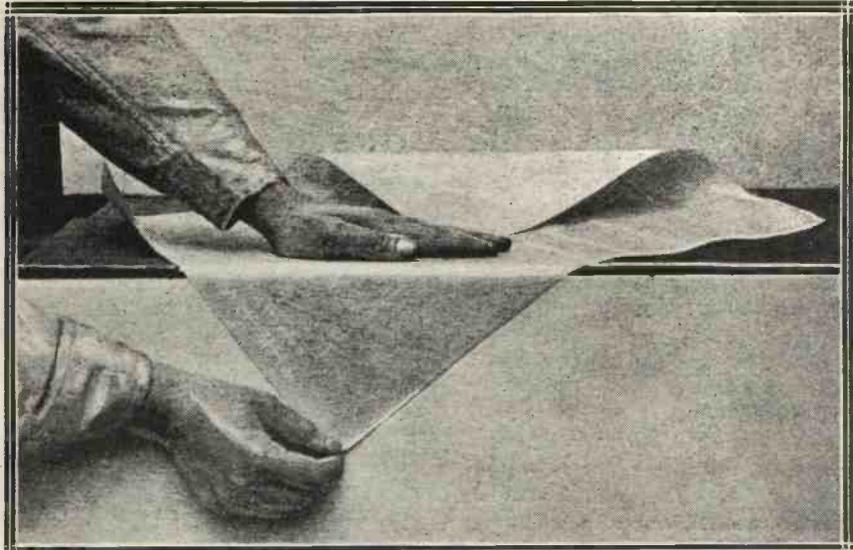
However, even the most refractory blueprint can be straightened and made to lie flat on a level surface by the following means.

Place the rolled blueprint on a table or drawing-board, and allow one corner of the blueprint to drop down over the edge of the table or board.

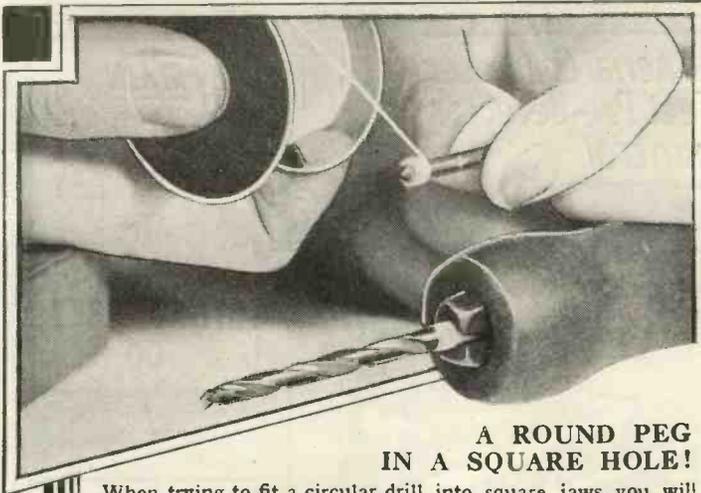
Now, grasp the corner of the blueprint firmly with the fingers of the right hand, as illustrated in the accompanying photograph, and, placing the palm of the left hand flat upon the blueprint, draw the print slowly and steadily over the edge of the table or drawing-board, taking care to bend the blueprint backwards over the edge.

One application of this method will usually suffice. If, however, the blueprint is an unusually refractory one, it may be necessary to repeat the process.

MAKING IT LIE DOWN FLAT

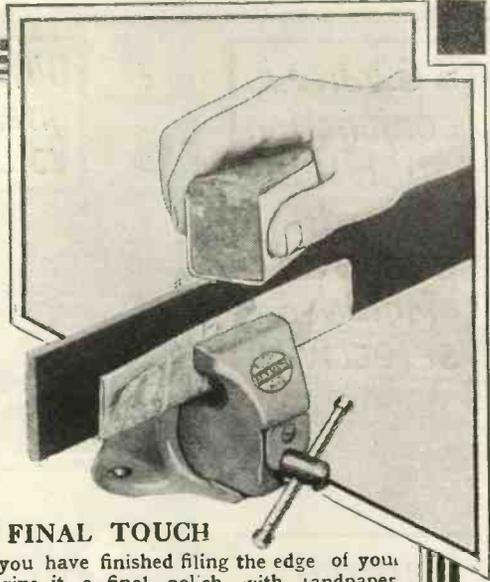


The edge of a table or bench is very handy for straightening out blueprints or other plans which have been rolled up for a long time. The method is clearly shown in the photograph.



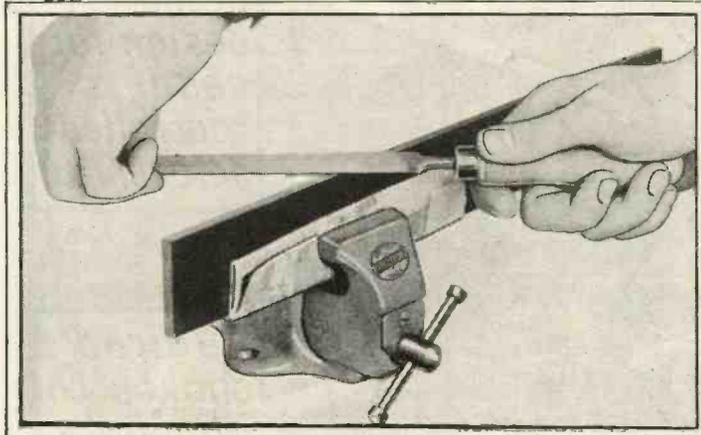
**A ROUND PEG
IN A SQUARE HOLE!**

When trying to fit a circular drill into square jaws you will find that a reel of ordinary cotton-covered wire will solve the difficulty. Wind some wire on to the end of the drill for an inch or so, taking care to keep the turns close together. The jaws will then grip the wire easily and firmly.



THE FINAL TOUCH

When you have finished filing the edge of your panel, give it a final polish with sandpaper. Your work will be much easier if you wrap the sandpaper round a wooden block as shown here. Be sure to place paper between the jaws of the vice and the surface of the panel to avoid scratches.

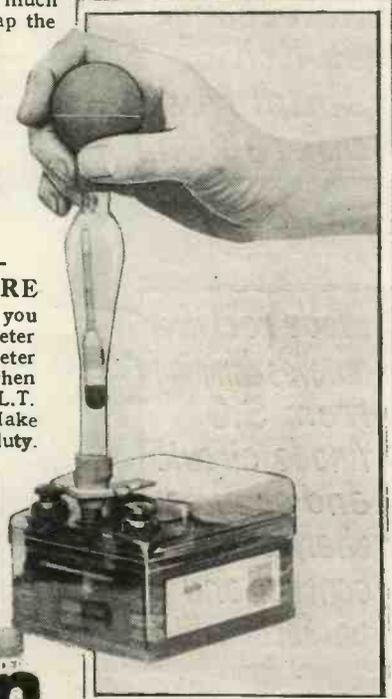


FINISHING OFF THE EDGES

The first stage in smoothing the edges of a panel or terminal strip is done with a file. Take care to steady the end of the file with your left hand so that it always meets the edge at a right angle.

ACCUMULATOR CARE

Just to remind you that a hydrometer as well as a voltmeter should be used when testing your L.T. accumulator. Make this a monthly duty.



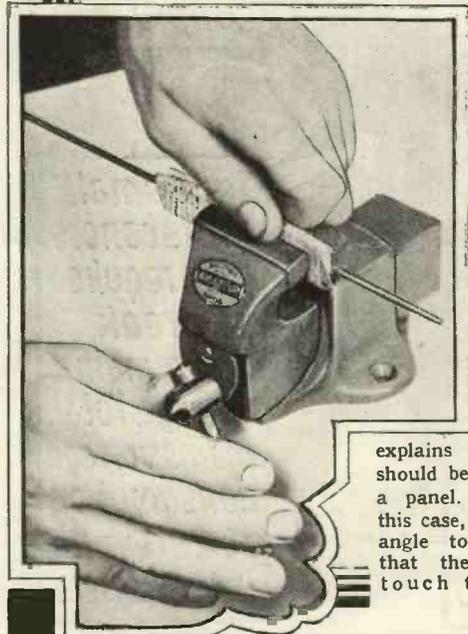
For the
Handyman

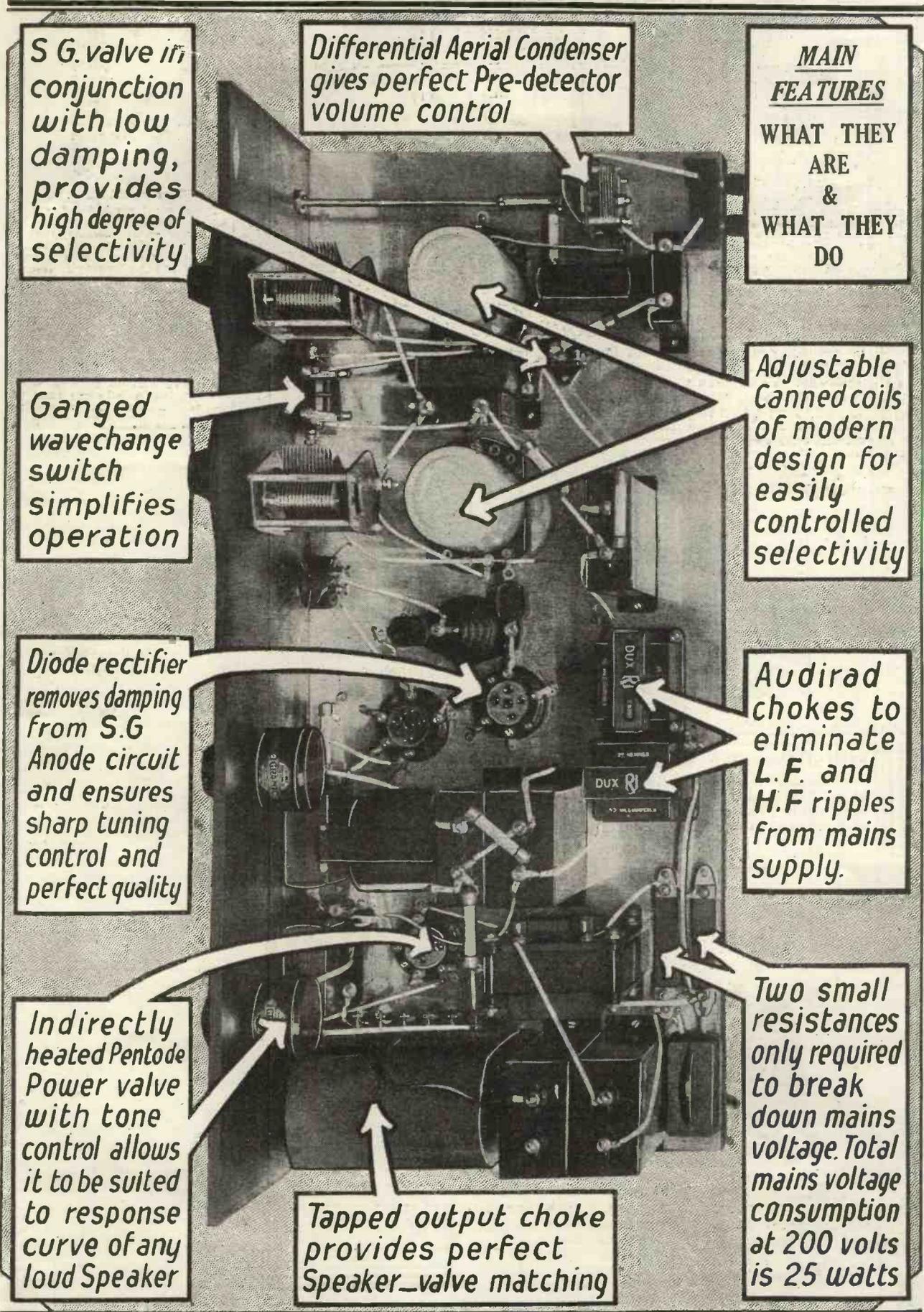
TWO CUTTING SUGGESTIONS

Threaded rod should have a thick wrapping of paper round it when being put into a vice for cutting, otherwise you will find that the thread will be damaged.

The picture on the right

explains how a fretsaw should be used for cutting a panel. The saw, in this case, is fixed at a right angle to the handle so that the latter does not touch the panel when working.





S G. valve in conjunction with low damping, provides high degree of selectivity

Differential Aerial Condenser gives perfect Pre-detector volume control

MAIN FEATURES
WHAT THEY ARE & WHAT THEY DO

Ganged wavechange switch simplifies operation

Adjustable Canned coils of modern design for easily controlled selectivity

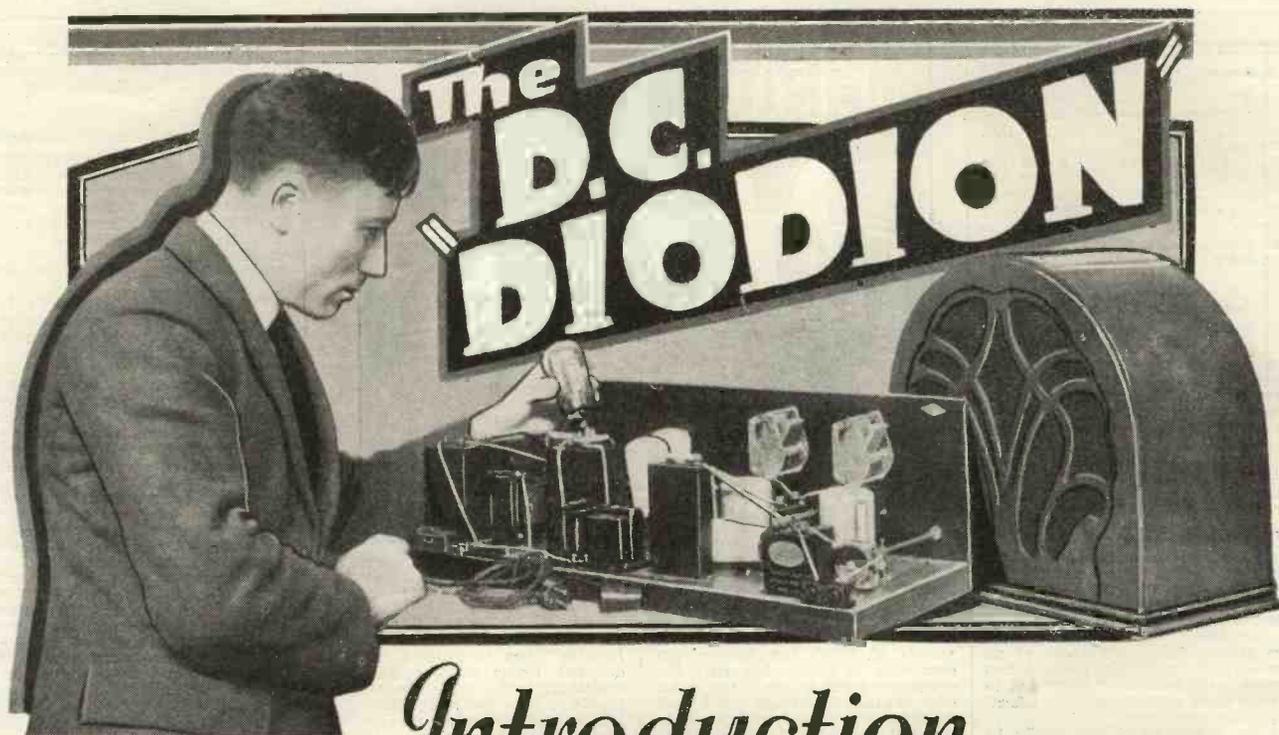
Diode rectifier removes damping from S.G Anode circuit and ensures sharp tuning control and perfect quality

Audirad chokes to eliminate L.F. and H.F ripples from mains supply.

Indirectly heated Pentode Power valve with tone control allows it to be suited to response curve of any loud Speaker

Tapped output choke provides perfect Speaker_valve matching

Two small resistances only required to break down mains voltage. Total mains voltage consumption at 200 volts is 25 watts



Introduction

THERE is perhaps no more difficult task in the whole field of radio than the design of apparatus to be operated wholly from the mains when those mains are direct current. Readers of MODERN WIRELESS will probably have noticed that, while the introduction of all-mains-operated receivers for alternating current is by now ancient history, the all-mains D.C. set is of relatively recent development and that there are comparatively few mains receivers available for the man "on D.C. mains."

Designing a D.C. Set

There are, of course, reasons for this, but since they are mostly of a highly technical character it is not our intention to weary you with a catalogue of the whys and wherefores of the tardy evolution of D.C. mains sets. Briefly, however, the difficulty in designing a D.C. receiver is due to the fact that with D.C. mains you have to "take 'em or leave 'em."

They just supply direct current at so many volts—and, in many cases, a surprisingly inconvenient number of volts. On the other hand, A.C. mains can be transformed to whatever one requires in the matter of voltage, etc.

Until quite recently the inconvenient nature of D.C. mains made designers, both of commercial sets and of sets for home-constructors, reluctant to put before their respective "publics" D.C. receivers. Fortunately, however, new types of valves have been invented specifically intended to be employed in D.C. receivers.

Eliminating Mains Hum

Even so, elimination of hum still presents so many difficulties that the designer is well advised to devote all his attention to the mains side of a new D.C. receiver and to let the receiver side itself conform to well-tried methods.

This procedure has been adopted in the home-constructor's D.C. receiver with which the following pages are concerned.

Last month we described a battery-operated receiver of unique design. This set tackled the problems attendant on achieving both selectivity and high-quality reproduction by the adoption of a circuit not hitherto available to any set possessor—either home-constructor or "commercial" purchaser.

Already we have received innumerable assurances of the good performance given by the "Diodion" to battery users, and we have accordingly had no hesitation in adopting the same basic circuit for our new receiver, the "D.C. Diodion."

Moreover, the use of a diode rectifier, besides enabling high selectivity to be obtained without complicated circuits, confers one extremely valuable advantage where D.C. mains are concerned. The diode requires no H.T. and, therefore, is not closely associated with the mains.

The Detector Generally to Blame

Since the detector valve of a receiver is the point where mains hum is most easily introduced, there are obvious advantages in having a detector which requires no H.T. when H.T. is taken from the mains.

In the "D.C. Diodion" we feel sure that we have achieved with unqualified success the long-sought ideal of set designers—a D.C. mains-operated receiver, highly sensitive, adequately selective and capable of giving superb quality at really worth-while volume.

Moreover, these desirable qualities are now (for the first time, we believe) available to the home-constructor at reasonable cost and with a very minimum of constructional complexity. The "D.C. Diodion" is very easy to build and purports to be a real "honest-to-goodness" wireless set capable of satisfying the needs both of the "DX-man" and the true music-lover.

LIKE all good circuits, that of the "D.C. Diodion" has been developed round valves of special characteristics. In fact, no other course is open when evolving a D.C. receiver, since special D.C. valves must be used.

In the "D.C. Diodion" a new type of D.C. valve introduced by the "Mazda" firm has been employed. These valves, unlike most of their predecessors in the D.C. field, require no more "filament" current than do ordinary battery valves—that is, .1 amp.

Reasonable Running Costs

Actually, of course, the valves are of the indirectly-heated type. This is a very valuable feature indeed, as not only does it enable the running costs of a D.C. receiver to assume reasonable proportions, but it does away with what has previously been the bugbear of D.C. sets—the need for having a robust resistance element, external to the set, to break down the mains voltage to the lower voltage required by the valves' heaters.

When the heaters require high current this resistance gets quite appreciably hot, and where best to house it often becomes just that irritating sort of domestic problem which should not accompany the use of a wireless set.

In the "D.C. Diodion" this resistance (hitherto a thing of no mean bulk) takes the form of two small strip resistances connected in parallel and mounted on the baseboard of the set itself.

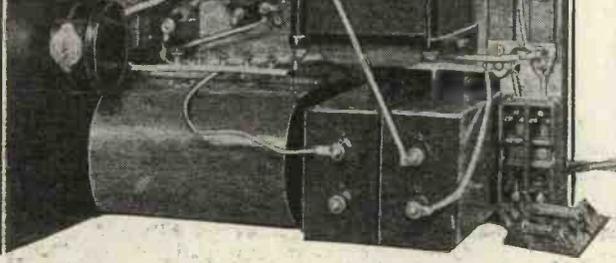
The heater circuit can easily be followed in the theoretical diagram. Let us start at the positive mains terminal.

Following the lead from this terminal the first component is a fuse, which, of course, protects the whole set—both H.T. and heater circuits. Then there is a branching of leads; one way to two smoothing chokes and the other to two parallel connected resistances.

Tracing the Circuit

We take the way of the resistances and come to a smoothing choke (it is necessary to smooth the current to the heaters). From this choke (ignoring the 4-mfd. heater smoothing condenser) the lead carries on to the pentode output valve, and from thence, it goes right away to the S.G. valve at the other end of the set and then passes through the diode detector and the single L.F. valve to the coil on the baseboard, which is, of course, connected through another fuse to the mains negative.

Making the Most of YOUR MAINS



Tracing the circuit in this manner reveals that all the heaters are connected in series, but that the sequence of the valves seems a bit odd. At first sight there would seem no purpose in going from pentode to screened-grid and then doubling back, so to speak, through the remaining valves.

It is, however, very important to observe this order of connection when making the set, and further reference to this matter will be made in the section dealing with the actual construction of the set. Actually, the reason for the queer sequence is to prevent the pentode anode current from traversing the heaters of the other valves when making its circuit. The pentode anode current is about 40 m.a. and thus would make the heater current of the other valves 140 m.a. (instead of 100 m.a.) if it was not properly diverted.

Minimum Smoothing

So much, then, for the heater circuit. Next in importance (since we are discussing the circuit of a mains receiver) is the H.T. supply. Of course, the supply has to be smoothed. Inspection of the circuit will show that a minimum of smoothing has been employed.

The original version of the "D.C. Diodion" has been tried on two different mains supplies and the smoothing found to be adequate in providing hum-free reception.

It is, however, an unfortunate fact that D.C. mains are most disconcertingly varied in respect to their hum-providing qualities. On some mains it is possible to dispense with smoothing almost entirely and reception will only be accompanied by an easily-tolerated faint hum.

A Saving of Cost

On other mains the ripple is so bad that really extensive smoothing of the supply is required before hum-free reception is obtained. In the "D.C. Diodion" the smoothing has been designed partially to save cost.

It has not, however, been cut down to a ridiculous minimum. On the other hand, we will be frank and say that an increase of smoothing may be called for where the mains are very bad, and anyone who makes the "D.C. Diodion" and encounters excessive hum can safely assume his mains to be bad. Such constructors, however, should not despair.

The "D.C. Diodion" has been purposely designed to be flexible, and additional smoothing components can

easily be added if the occasion arises. Those troubled by very bad mains hum should not hesitate to write to us about it.

Immune From Break-Through

In respect to the actual reception side of the circuit, the "D.C. Diodion" does not differ materially from the battery "Diodion" described last month. The tuning coils have the valuable feature of being completely immune from break-through of medium-wave stations on the long waves.

The S.G. valve is coupled to the detector by ordinary tuned anode, with, however, a special arrangement which allows of the moving vanes of the anode tuning condenser being connected directly to earth. This avoids the evil effects of hand-capacity which have caused the tuned-anode circuit to fall into disfavour in comparison with the (often less efficient) tuned-grid and H.F. choke arrangement.

A .00005 (four noughts, you will notice) fixed condenser couples the tuned-anode circuit to the diode detector. The action of a diode detector is simplicity itself.

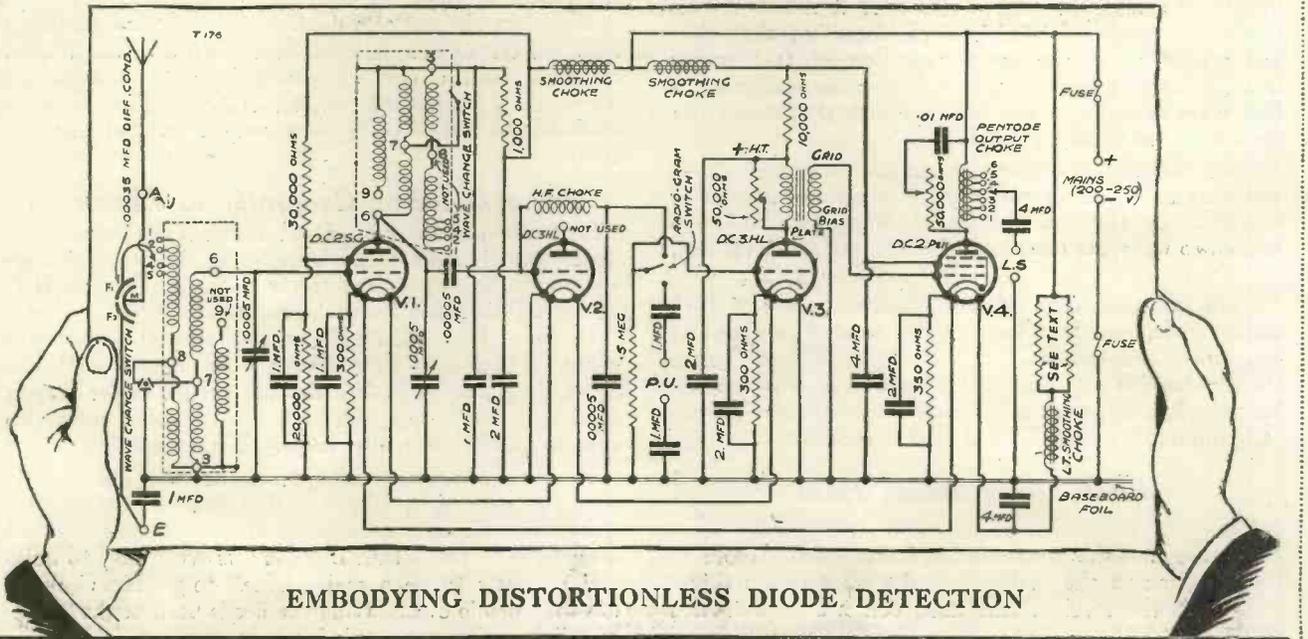
The carrier-wave of the received station is amplified by the S.G. valve and applied to the plate (actually the grid is used) and cathode of the diode. As is well known, a two-electrode valve only allows current to pass one way—that's why it was called a "valve."

Diode Rectification

The diode, therefore, "chops off" one half of the oscillations of the carrier-wave so that pulsating direct current appears as the result of the diode rectification. Associated with the diode you will observe an H.F. choke, another .00005-mfd. condenser and a 1-megohm resistance.

These components "smooth out" the pulsations in the rectified carrier and make it sensibly direct current, and at the same time separate from the carrier the low-frequency signal voltages. The "smoothed out" rectifier carrier flows to earth down the 1-megohm resistance and, in accordance with Ohm's law, a voltage is thus produced across the resistance which can be used for bias.

Actually, we have biased the first L.F. valve in the "D.C. Diodion" 1½ volts for gramophone reproduction, where, of course, the absence of a carrier-wave prevents any self-biasing. A little constantly applied negative bias is, too, required with indirectly-heated valves to prevent grid current flowing.



EMBODYING DISTORTIONLESS DIODE DETECTION

COMPONENTS *for the* D.C. DIODION

WHILE it is, of course, essential for every component in such a receiver as the "D.C. Diodion" to fulfil its destined purpose efficiently, more than usual care has to be exercised in choosing the component parts of a D.C. receiver.

In making the original model of the set the values of all voltage-dropping and decoupling resistances were very carefully calculated with

VALVES, LOUDSPEAKER AND AERIAL EQUIPMENT

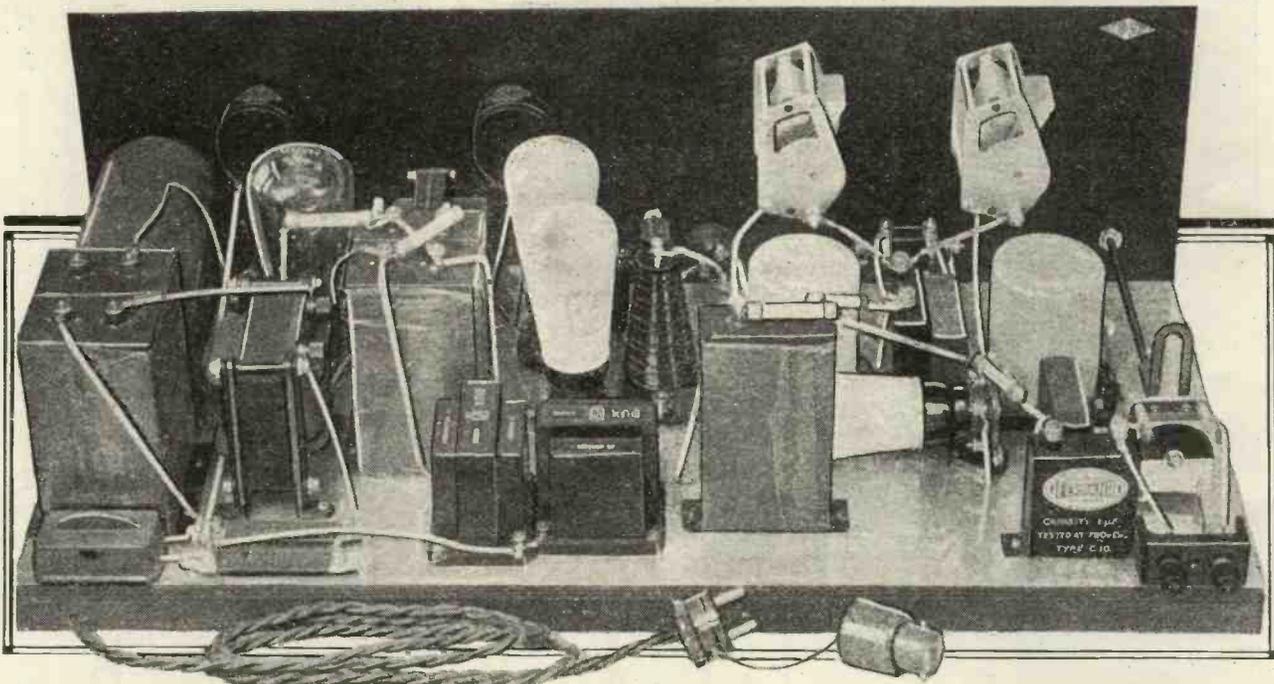
Valves. Mazda. S.G. : D.C.2S.G. ;
Det. : D.C.3H.L. ; 1st L.F. :
D.C.3H.L. ; 2nd L.F. : D.C.2PEN.

Loudspeaker. Marconiphone, Blue Spot, H.M.V., Celestion, B.T.-H., R. & A., Atlas, W.B.

Aerial and Earth Equipment. Electron "Superial" ; Graham Farish "Filt" earthing device.

reference to the resistance possessed by the smoothing chokes and other apparatus in the same circuit.

Of course, a fair amount of tolerance is permissible in this respect, and it would be quite safe to employ any of the alternative components given in the list accompanying this article. If, however, any gear not mentioned in the list is to be used, it is as well to consult expert opinion.



MAKES WHICH WE RECOMMEND

PANEL

24 x 8 in. (Permcot, Becol, Peto-Scott, Wearite, Goltone, etc.).

BASEBOARD

24 x 10 in. (Peto-Scott aluminium covered).

CABINET

For 24 x 8 in. panel and 24 x 10 in. baseboard (Cameco, etc.).

VARIABLE CONDENSERS

2 .0005-mfd. tuning condensers (Polar, Cyldon, J.B., Utility, Lotus, Formo).
2 slow-motion dials (Igranic Indigraph).
1 .0003 to .00035-mfd. differential (Lotus, J.B., Telsen, Ready Radio, Peto-Scott).

COILS

2 T.D. coils (Colvern):

RESISTANCES

2 strip resistances (Colvern). See text.
1 1-megohm resistance (Graham Farish, Dubilier 1-watt).
1 20,000-ohm resistance (Dubilier 1-watt, Graham Farish).
2 300-ohm resistances (Dubilier 1-watt, Graham Farish).

1 1,000-ohm resistance (Dubilier 1-watt, Graham Farish).
1 30,000-ohm resistance (Dubilier 1-watt, Graham Farish).

1 350-ohm resistance (Dubilier 1-watt, Graham Farish).
1 10,000-ohm resistance (Dubilier 1-watt, Graham Farish)

2 potentiometers, 50,000 ohms (Igranic, Lewcos, Tunewell, Wearite, Colvern, Watmel).

SWITCHES

1 twin wave-change switch (Red Diamond).
1 3-point change-over switch (Bulgin, Ready Radio, etc.).

L.F. CHOKES

2 L.F. chokes (R.I. Audlrad).
1 L.F. choke (Wearite H.T.1).
1 pentode output choke (Atlas C.P.S.).

VALVE HOLDERS

3 5-pin valve holders (Lissen, Telsen, W.B., Lotus, Bulgin, Benjamin).
1 5-pin S.G. valve holder (Lissen, W.B.).

L.F. TRANSFORMER

1 L.F. transformer (Ferranti A.F.3).

FIXED CONDENSERS

4 1-mfd. condensers (Ferranti C.10, Telsen, Lissen, T.C.C., Dubilier, Igranic, Formo, etc.).

2 1-mfd. condensers (Telsen, T.C.C., Dubilier, Lissen, Igranic, Formo, Ferranti, etc.).
2 2-mfd. condensers (Telsen, T.C.C., Dubilier, Lissen, Formo, Ferranti, Igranic, etc.).

3 4-mfd. condensers (Dubilier type B.S.).
2 2-mfd. condensers (Dubilier type B.S.).
1 .01-mfd. mica condenser (Dubilier, T.C.C.).
2 .00005-mfd. condensers (Dubilier type 665).

H.F. CHOKE

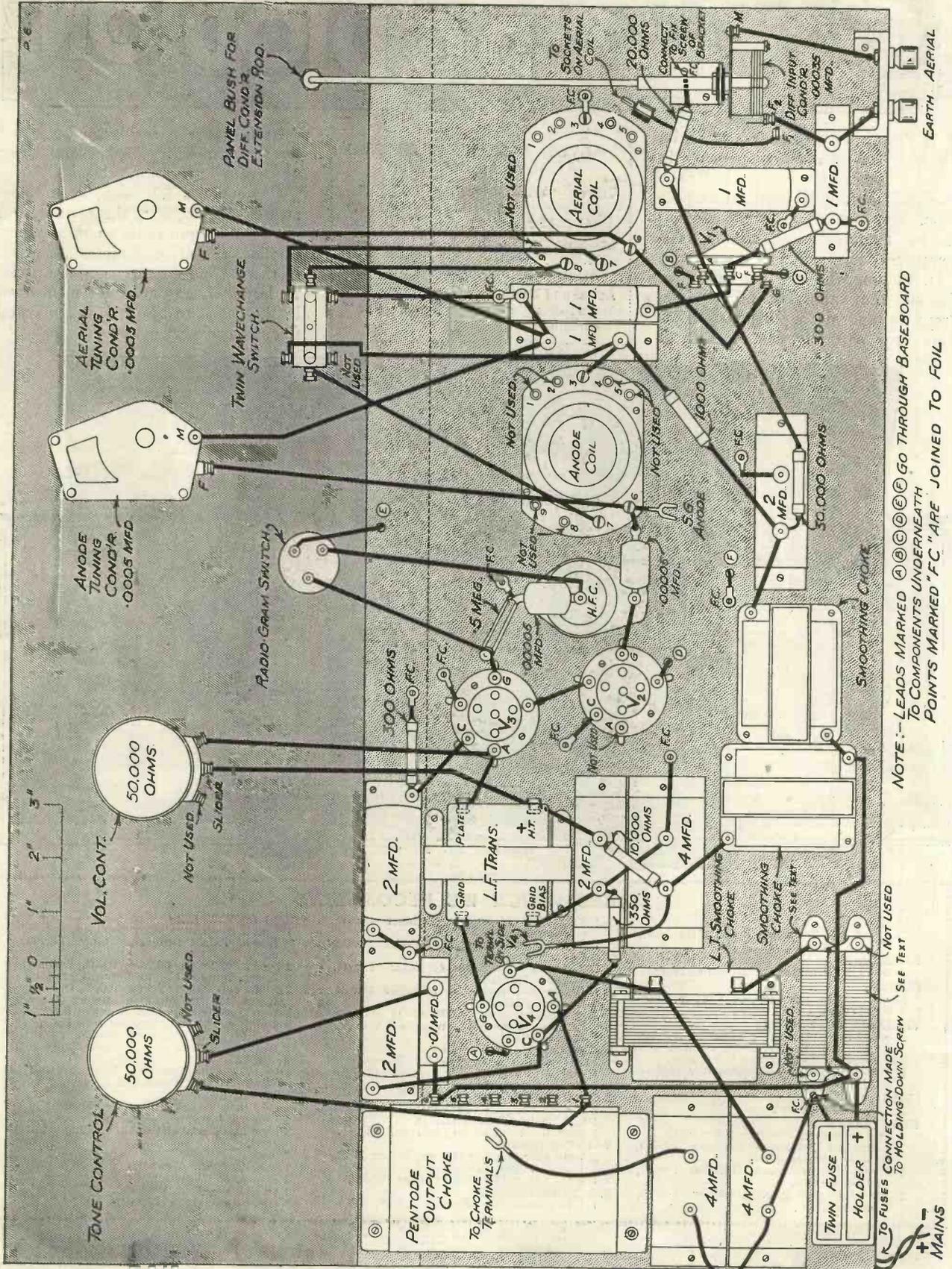
1 H.F. choke (Tunewell, Lewcos, Ready Radio, Telsen, Wearite, R.I., etc.).

MISCELLANEOUS

1 twin fusc (Belling & Lee, Bulgin, etc.).
1 terminal block (Belling & Lee, etc.).
2 terminals (aerial and earth) (Belling & Lee, etc.).
1 plug.
1 bracket (small Wearite).
1 connector (Wearite).
1 panel bush (1/4 in. Wearite).
1 7-in. extension rod (Wearite).



Short Leads to Ensure High-Efficiency Operation



NOTE:—LEADS MARKED (A)(B)(C)(D)(E)(F) GO THROUGH BASEBOARD TO COMPONENTS UNDERNEATH
POINTS MARKED "FC" ARE JOINED TO FOIL

Much thought was given to the layout of this fine set, with the result that all the vital leads are as short as it is possible to make them. There is a certain amount of sub-baseboard wiring, but this is clearly described in the article and is clearly illustrated on another page.

CONSTRUCTION DETAILS

WHEN making the original model of the "D.C. Diodion," the fact that other models would be made by probably non-technical constructors was never lost sight of for one moment.

If one is not equipped with technical knowledge the construction of an all-mains receiver might be looked upon as being a somewhat risky enterprise, because where mains are concerned short-circuits are liable to be disastrous to the pocket.

To overcome this possible trepidation on the part of intending constructors, the "D.C. Diodion" has been made on a generous scale, so that the wiring diagram becomes ridiculously easy to follow and work can proceed with plenty of "elbow room."

Errors Unlikely

The wiring of the heater circuit requires to be done with care, and to make risk of error unlikely we are giving the point-to-point connections. The heater wiring runs partly under the baseboard, and where the wires go through the baseboard the wiring diagram is marked A, B, etc.

The connections are:

1. Terminal of L.T. smoothing choke nearest panel to F terminal of pentode valve-holder nearest L.F. transformer.
2. Other F terminal of pentode valve-holder through A, up through B to F terminal of S.G. valve-holder nearest panel.
3. Other S.G. valve-holder terminal through C, up through D to F terminal of V_s nearest smoothing choke.
4. Other V_s F terminal to F terminal of V_s farthest from panel.
5. Other F terminal of V_s down to foil.

A number of the connections of "earthy" points are made to the foil and these are all marked on the wiring diagram FC, meaning foil connection.

In two cases holding-down screws of components have been used for FC, the bracket holding the differential input condenser is one case, one of its holding-down screws having the wire "tag" of a 20,000-ohm resistance held under it.

Watch the Screen

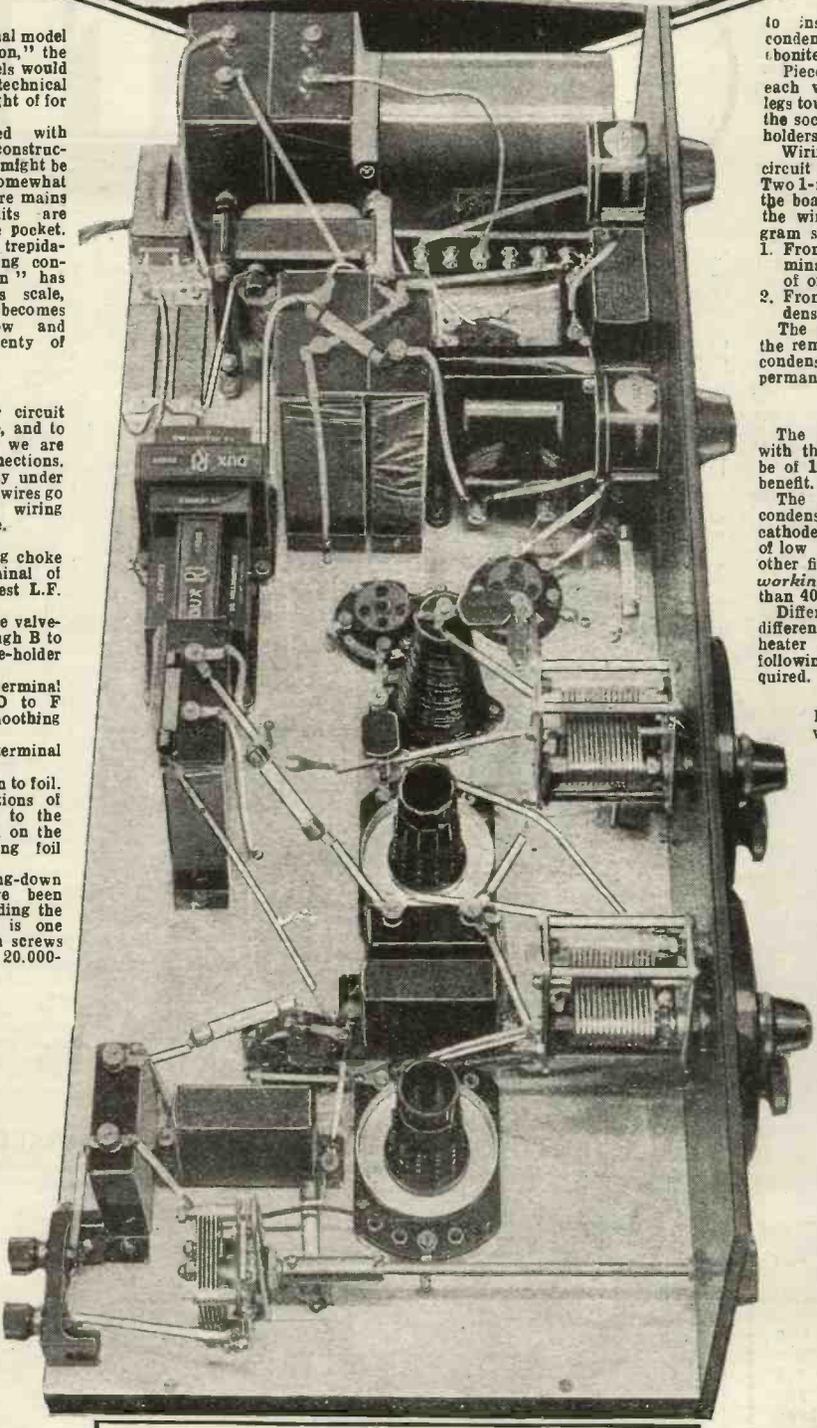
The screw of one of the parallel heater resistances clamps down the negative wire from the fuse box and from the 4-mfd. heater circuit smoothing condenser.

Care must be taken to see that the screen of the anode coil does not touch the metalised covering of the S.G. valve, which must not, in turn, touch the 2-mfd. condenser near to it.

If connection is made to the anode terminal by a piece of stiff wire there will be no risk of this.

When positioning the S.G. valve-holder, place the valve in the holder and find the position which allows the valve to lie snugly between the anode coil and 2-mfd. condenser with the anode terminal near to the No. 6 anode coil terminal.

Great care must be taken



to insulate the differential input condenser from its bracket by bonite washers.

Pieces of cardboard placed under each valve holder will prevent valve legs touching the foil by going through the sockets, as can happen with some holders.

Wiring of the gramophone pick-up circuit is partly under the baseboard. Two 1-mfd. condensers are fitted under the board as shown in the photo, and the wiring to them from the radio-gram switch is as follows:

1. From top right-hand switch terminal through E to one terminal of one of the condensers.
2. From one terminal of other condenser up through F to FC.

The pick-up itself is connected to the remaining blank terminals of the condensers, where it may remain permanently if desired.

Cathode Biasing

The 4-mfd. condenser associated with the L.T. smoothing choke may be of 1,000-v. working voltage with benefit.

The two 1-mfd. and two 2-mfd. condensers associated with the cathode biasing resistances may be of low working voltage type, but all other fixed condensers must have a working voltage rating not lower than 400.

Different mains voltages require different values for the two parallel heater circuit resistances. The following table gives the values required.

Mains voltage	Value of each parallel resistance	Total resistance
200	1,520	760
210	1,720	860
230	2,120	1,060
240	2,320	1,160
250	2,520	1,260

A really first-class H.F. choke must be used, otherwise the diode will try to pass on to the first L.F. valve its exclusive task of rectifying. If this happens the diode really does become the "passenger" which some people accuse it of being and which, properly used, it most emphatically is not.

Wave-change switching of the aerial and anode coils has been made a "one-knob affair" by employing a twin wave-change switch in which the two separate switches are actuated by a single knob. Separate switches could, of course, be used, and could be mounted under each tuning condenser.

As Specified

The valves specified must be used. Almost every value in the set would have to be re-calculated were other D.C. valves substituted for those specified.

A special aluminium-covered baseboard has been used, and this is raised slightly by battens running along three edges. As a few of the wires run under the baseboard it is essential for it to be raised to give sufficient clearance for this wiring.

This novel view of the "D.C. Diodion" is intended to show how well the components are spaced. This is a matter of very great importance when constructing receivers for D.C. mains.



THE actual operation of the "D.C. Diodion" calls for little comment. You just switch on, wait about half a minute for the heaters to warm up, and then turn the dials and get "those foreigners." There are, however, some initial adjustments to make—especially with regard to the reception of the local station.

If you have read in the previous pages the brief outline of the way in which the diode rectifies and then self-biases the first L.F. valve, it will no doubt have occurred to you that a very strong station could cause the diode to supply so much rectified carrier current that the first L.F. valve receives too much grid-bias.

Anode Current Ceases

This actually does happen, and the first L.F. valve can be biased by the action of the diode so much that the anode current ceases to flow and, of course, the valve "packs up" and nothing happens. By connecting a milliammeter in the anode circuit of the first L.F. valve this process can be actually witnessed.

If the dials are turned towards the tuning position for a strong "local" the milliammeter needle will gradually

creep towards zero as the correct tuning for the station is approached. At a point near the correct "tune" the meter will fall suddenly to zero. Of course, this effect is also made manifest by a cessation of signals.

When, therefore, you have finished the construction of the set, adjustment for local station reception may as well be made. The adjustment is, of course, one which will reduce the local station's input to the detector to reasonable dimensions.

The first step, then, is to try adjusting the differential input condenser. Turn this in an anti-clockwise direction.

It is more than likely that even with this turned to zero it will still be possible to tune towards the local into a degree or so of silence and then through tune and silence until you hear him again. This, of course, indicates that the first L.F. valve is still being over-biased and that the nut for the local requires still further reduction.

Try, then, adjusting the taps on the aerial coil. Greatest input and least selectivity is given by plugging into the No. 1 socket on the coil base. If evidence of too great an input is still apparent, try No. 2, then No. 4 and No. 5.

Very Carefully Calculated

In some cases it will be necessary to disconnect the aerial plug from No. 1 and set the differential input condenser full to the right. The local will then be very sharply tuned, but will not be strong enough to over-bias the L.F. valve. Of course, when once found, the local station adjustment will be an easy one to revert to.

It is worth while finding it definitely once and for all. The overall amplification of the set has been very carefully calculated, so that when the L.F. valve is not over-biased it is impossible to overload the pentode. Under such circumstances the set

becomes a true music-lover's companion.

The volume control becomes a real control. You can set it at just the right place for talks and you will think the speaker is in the room. When Henry Hall says "Good evening, everybody," you can "turn up the wick" and the neighbours will like it!

The "D.C. Diodion" is, of course, not a "local station set." It has, in fact, been designed so as to meet the "DX" man's requirements very fully.

The "Works" Exposed

The man whose delight it is to "reach out" and has no care how long into the night he sits to increase his "bag" of stations will probably not bother to house his "D.C. Diodion" in a cabinet. His pleasure is to have the "works" exposed so that he can select just the right aerial tap for the requirements of the moment.

With the set before him he will appreciate the careful choice of positions in which the tuning dials are placed. With wrists and arms restfully on the table his fingers fall naturally on the knobs of the tuning dials. Dials which are slow motion and which pretend to be nothing more than an efficient silkily-acting link between clumsy human fingers and delicate electric control.

With aerial on No. 1 and differential "full in" he sets his dials to 100 degrees. Slowly turning away from the 100-degree mark, he reaches about the 90-degree position and the hiss of a carrier immediately swells into the sounds of the Kursaal orchestra at Ostend. Not the local tuning high, but Brussels No. 1 as loud as the local!

The novice with little experience of tuning will be amazed at the extraordinary number of stations which will result from one slow turn of the dials from 100 degrees to zero. Of course,

the "slow turn" will take about a couple of hours to complete, since the stations all have to be identified.

The selectivity of the receiver is of a very high order indeed. Round about the wavelength of the local stations it is necessary to enhance the selectivity by altering the aerial tap to the higher numbers.

Finally, a word concerning the adjustment of the output stage. This is best done when tuned correctly to the "local." Select the tap on the output choke which gives reproduction slightly on the high-pitched side with the panel tone-control knob tuned fully to the left.

There should be a tendency for the letter "S" to whistle when pronounced by a speaker. This is the best choke tap, and a perfect balance of the high and low notes should then be obtained with the control about central.

Turning the control more to the right will suppress high notes still further and will completely eliminate the heterodyne whistle which accompanies so many stations nowadays.

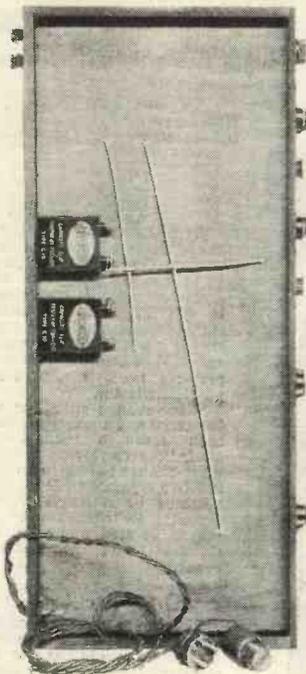
Not An Omission!

The absence of an on-off switch may be regarded as an omission. It was, however, not considered necessary to incorporate any switch. After all, the set has got to be connected to the mains and there will normally be a switch if connection to the mains is made at a power-plug.

If, however, you plug into a lamp-socket you will not want a long lead trailing permanently to a lamp-holder, and the action of removing the lead will, of course, switch off the set.

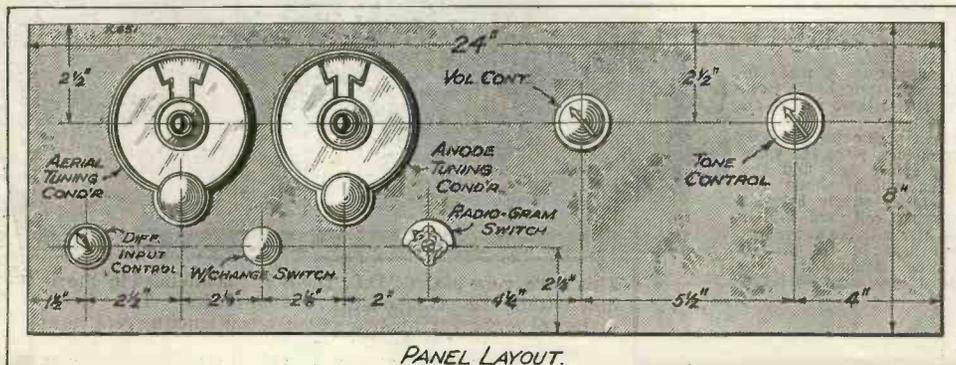
The plug employed in the original version of the set may be plugged either into a lamp holder or into the socket of a power-point, and it was, therefore, considered unnecessary to incorporate a switch in the set.

BELOW DECK



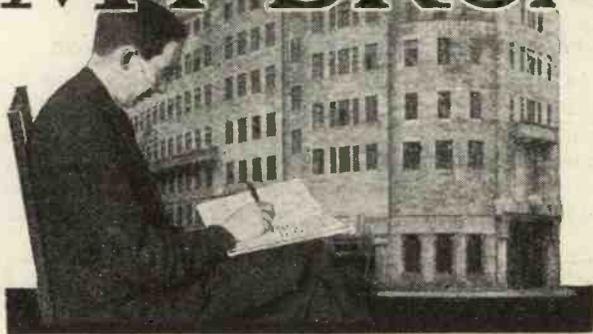
{Above} There are two components and three wires only below the baseboard. {Right} The panel layout has been arranged on scientific lines, high efficiency being considered before anything else.

A SCIENTIFIC LAYOUT GIVING UNSURPASSED EFFICIENCY



PANEL LAYOUT.

MY BROADCASTING DIARY



Our Own Broadcasting Correspondent keeps a critical eye on the affairs of the B.B.C., and each month, for the benefit of listeners, comments frankly and impartially on the policies and personalities controlling British Broadcasting.

Political Broadcasting

THE announcement of the intention of the B.B.C. to release itself from the necessity of consulting Party Headquarters on all matters of political broadcasting created a great stir in circles both high and low. Even the Prime Minister instigated inquiries to discover to what extent the B.B.C. proposed to exercise freedom.

As a matter of fact, however, the B.B.C. had no desire to break away from its previous commitments without the agreement of those concerned. As this obviously could not be secured before the re-assembly of Parliament, all that was done was to reserve in the Talks Programme regular periods on Friday evenings for what were described as "Political Broadcasts."

It is known that Mr. Whitley, Chairman of the B.B.C. and ex-Speaker of the House of Commons, has taken this very much to heart, and hopes to be able to secure for the B.B.C. that freedom and responsibility in political matters which had been denied to his predecessor, Lord Clarendon.

The matter will engage Parliamentary attention probably about the end of October. I believe that the B.B.C. will get from the House of Commons much more freedom than it could hope for from the Whips' offices.

The Provinces Alert

Listeners outside London are taking an increasing interest in the politics of broadcasting. Problems about Regional programmes can no longer be solved in private at the headquarters of the B.B.C.

More and more people are making a specialised study of the practical aspects of broadcasting in relation to available artistic resources, as well as available means of distribution. It follows that it is now more important than hitherto that the B.B.C. should lose no opportunity of justifying its policies and explaining the background of its every action.

I believe that on the whole the B.B.C. so far has followed a course which has been demonstrably to the

advantage of the listening public. I have no reason to believe that there is any intention on the part of the B.B.C. to deviate from this course.

On the other hand, I am sure that unless the B.B.C. takes much more pains than formerly to educate the public to its policy, it will be subject to growing misapprehension. Fortunately there are not wanting signs of a new attitude in this respect.

The Opera Subsidy

Although there has been no public discussion recently of the Opera subsidy, the problem has engaged serious attention behind the scenes. The subsidy was carried on this year in the face of a hostile House of Commons, principally because it was possible to plead that the original contract was undischarged.

No such stipulation exists next year. The Postmaster-General, Sir Kingsley Wood, has already found himself in the awkward position of having to justify officially what he had attacked when in Opposition. This he could do, with some plausibility, as long as there was the contractual argument.



John L. Baird, British pioneer of television, with the latest model "Televisor" which he has prepared now that the B.B.C. is sending out regular television programmes. It is an all-mains apparatus, extremely compact, and with a larger viewing screen than the previous models.

Candid Comments on Radio Topics of To-day

Next year, however, he will have to face the problem *de novo*. I have no hesitation in prophesying that the Opera Subsidy will not be renewed. It will be left for the B.B.C. to determine whether it will care to continue the endowment on its own.

Lure of the Film

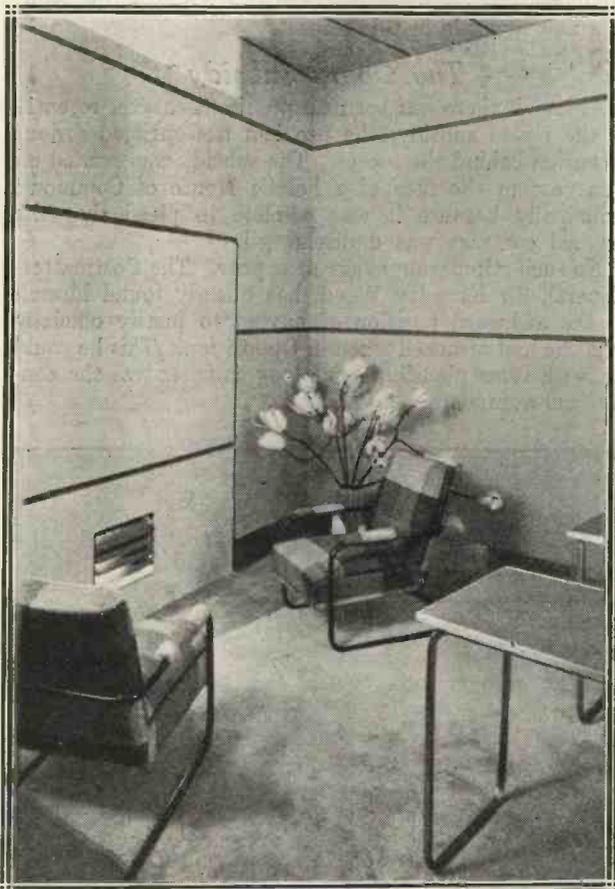
It is several years now since the B.B.C. was disturbed by serious attempts to secure its staff for outside concerns. Then the movement was known as "The gold rush to Elstree," which, at the beginning of "Talkies," attracted a number of the most promising members of both the engineering and programme departments.

Now, more unexpectedly, come threats of raids on the production staff of the programme department. Again it is the film, but this time not from Elstree, but from Hollywood, where apparently several of the B.B.C. producers appear to be held in high regard.

The truth is that B.B.C. Dramatic Production has developed with singular rapidity, and several brilliant young men have established a claim to international reputation.

I need mention only two: Mr. John Watt and Mr. Eric Maschwitz. I wonder what the B.B.C. will do about it.

FOR HEATED DEBATES?



The debates' studio at Broadcasting House is well arranged to give the speakers that "after-dinner" feeling. Two comfortable chairs ranged on each side of an electric fire provide an aid to informal oratory.

Will it take the business line of protecting its assets or will it be indifferent, leaning towards a Civil Service line where personalities are disregarded?

Broadcasting House Accommodation

As long as a year ago I gave the B.B.C. full credit for its foresight in staking a claim to several properties adjoining Broadcasting House in Portland Place. It was evident then that the accommodation at Broadcasting House was barely adequate for existing requirements and hopelessly inadequate for necessary future expansion.

Have you ever thought

how thoroughly MODERN WIRELESS deals with every aspect of broadcasting technique?

- ☐ In MODERN WIRELESS the taste of each reader, whether constructor or listener, is fully catered for.
- ☐ In "My Broadcasting Diary" you have, every month, an insight into the policies and personalities of British Broadcasting.
- ☐ In "The World's Programmes" you have a panorama of the changing conditions of wireless all over the world.

You cannot afford to be without your monthly copy of "MODERN WIRELESS."

I am all the sorer to observe, therefore, that nothing has been done as yet to provide the additional accommodation, the need for which is now definitely critical. I have the impression that a strenuous endeavour has been made to contract all the activities of broadcasting in order that they may fit into Broadcasting House.

This is surely a splendid example of the "wrong end of the stick." When it becomes necessary, as apparently it is, for the important institution of the Children's Hour to migrate from studio to studio, from day to day, in order to make way for Television, it seems to me high time for heroic action.

If the authorities of the B.B.C. continue in their apparent determination to make limited accommodation a salient criterion, they will be faced, before very long, with a more serious situation than could ever arise from accusations of extravagant expansion, however well based.

Sir Henry Wood and the B.B.C.

There seems to be some ill-natured imp constantly interfering in the relations between Sir Henry Wood and the B.B.C. The splendid partnership of the B.B.C. and Sir Henry has saved the tradition of the Promenade Concert and has given it greater distinction; but through some ineptness, or bad luck, or a combination of both, every now and then there is evidence that Sir Henry is acutely irritated by the attitude of the B.B.C.

Strange to relate, despite the success of the present Promenade Season, it still hangs in the balance whether Sir Henry will be at his accustomed place in the Queen's Hall next summer. The reason simply is that some influences in the B.B.C. are determined to prevent Sir Henry from having a due share of the winter Symphony Concerts of the B.B.C. Season. How much better it would be if all arrangements of this kind were left entirely to the sure judgment and sound insight of Dr. Adrian Boult and his able administrative assistant, Mr. Mase.



THE WORLD'S PROGRAMMES HOW WHEN AND WHERE TO HEAR THOSE FOREIGNERS



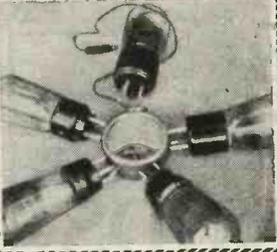
THE YOUNG IDEA.—They start 'em young in the States. Take a look at John A. Webster (in the circle above) with his transmitter (after getting his licence. He's only twelve years old—and they believe he's the youngest operator in the world. Any claims from this side of the Atlantic?

CONTENTS OF THIS SPECIAL SUPPLEMENT

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| <p>The Broadcasting Stations of Europe.
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Tuning-Up for Tuning-In.
Running Radio to Every Room.
The Biggest Set in the World.</p> | <p>On the Medium Waves.
Saturday Night in Central Europe.
Senhor Santos' Station.
Portugal's Pioneer Broadcaster.
Are Short Waves Worth While?
Station Information.
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A Little-Known Waveband.</p> |
|---|---|

FROM HERE AND THERE

Practical paragraphs about the latest developments in the programmes of the world.



TAL-AVIV. The first Hebrew broadcasting station is now operating at Tal-Aviv, Palestine. English as well as Hebrew is used for announcing, and there is talk of a short-wave relay for the benefit of Zionists the world over.

BASLE. The Basle station was recently closed down for a fortnight, overhauled and "spring-cleaned."

G 5 V C. This is the call of the amateur radio station at Bradford that has been co-operating with the Bradford Police in communicating with a radio-equipped car. Another amateur station, G 2 D R, has also assisted.

LUXEMBOURG. The lady engaged by the Luxembourg station authorities as announcer is a German girl—Miss Vera Siewert.

BERLIN. A new high-power transmitter (60 kw.), to be opened next year, will be erected in the grounds of the Tegel prison.

BANANA. This name now appears on the official list of the world's broadcasting stations! Situated in the Belgian Congo, Banana works telephony on a band of wavelengths between 15 and 20 metres.

NASHVILLE, TENNESSEE. The new 50-kw. station at Nashville now has America's tallest mast, which is 878 ft. in height.

SYDNEY. The Sydney short-wave station has been testing television with a Marconi Co. experimental station at Chelmsford, Essex.

G 2 B S. The call-sign G 2 B S is that of the special Marconi beam station at Chelmsford, which has been testing television with Australia. (It should not be confused with G 5 S W, which is the Empire short-wave station at Chelmsford.)

DAVENTRY. The B.B.C. plans to erect at Droitwich a station that will eventually replace 5 X X and 5 G B. It will be a twin-waver, with 100 kw. on long waves and 70 kw. on medium waves.

POSTE PARISIEN. The recent recitals of music of the "Theremin" type on an "electrical organ" were very successful, and have created considerable new interest in the subject.

BOMBAY. The Bombay broadcasting station, after many vicissitudes, recently celebrated its fifth anniversary.

BARI. This new Italian station, on 296.4 metres, will transmit its own programmes for about a year, as no suitable landline to link it with the other Italian stations can be ready for about twelve months.

It will rely partly on gramophone records and Blattnerphone reproduction.

2 F C. The most uncommon "O.B." ever given from 2 F C, Sydney, N.S.W., was the recent "flying wedding." A clergyman married an adventurous couple whilst flying over the city, and listeners tuned-in could hear the responses and the roar of the plane's engines.

BETZENHAUSEN. Early next year a new 5-kw. station for Freiburg-im-Breisgau is to be ready for action, in the

neighbouring village of Betzenhausen.

BRESLAU. There seems to be some disappointment with results from the much-heralded new Breslau station with its unique "aerial" consisting of a vertical wire inside a wooden mast.

Certainly results in this country are not outstanding, but this was expected, and was intended to be accompanied by a considerable increase in power at short distances.

246 METRES. The "roar" which is heard when tuning to 246 metres is due to the fact that no less than eight stations use that wavelength. They are Berne, Cartagena, Cassel, Eskilstuna, Kiruna, Linz, Saffle, and Turku—all of low power.

KOOTWYK. The slogan of Kootwyk, on 16.82 metres, is "The Voice of Holland."

RADIO-AGEN. This station was put out of action for many months by the floods in the South of France, but has been testing its new transmitter on 455 metres.

GOUDA. A daring radio pirate has been operating an unlicensed transmitter in the Gouda area—he opened nightly by wishing "Good luck" to the officials who were tracking him down!

EDINBURGH. Scotland's third annual National Radio Exhibition is to be held in the Exhibition Hall, Waverley Market, Edinburgh, from Oct. 12th to Oct. 22nd.

KAUNAS. This long-wave Lithuanian station, on 1,935 metres, gives its news bulletins in Finnish and in Swedish, both languages being spoken in Lithuania.

RADIO-PARIS. "Physical jerks" are given at 6.45 a.m. daily, except on Sundays, from Radio-Paris.

UDDEVALLA. This Swedish station, on 229 metres, has the lowest-powered transmitter in Europe (fifty watts).

THE EMPIRE STATION. The B.B.C. expects that not only will the new Empire station under construction at Daventry be testing before the end of the year, but that its full Empire service will be in regular operation early in 1933.

DROITWICH. An official notification gives March, 1934, as the probable date when Droitwich will take over the Daventry National and Midland Regional transmitters.

FRANGINS. The League of Nations' transmitter at Frangins usually employs a wavelength of 38.47 metres for relays to the U.S.A.

REYKJAVIK. The long-wave Iceland station at Reykjavik (1,200 metres) has recently been getting over well to this country. Its week-night programmes usually close at 9.30 p.m. or soon after.

ROME. The week-day programmes are always preceded by a news bulletin at 8.15 a.m.

EIFFEL TOWER. A wavelength of 2,650 metres is used for the daily time signals given at 9.26 a.m. and 10.26 p.m. G.M.T.



A VOICE FROM THE CLOUDS

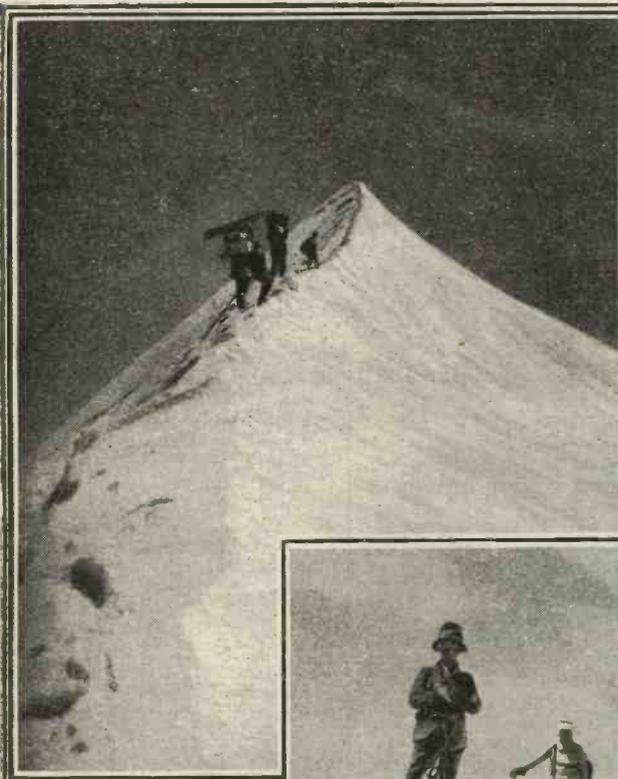
High above the rain clouds and nearly three miles from the ground a little microphone broadcasts its message to the valley beneath. The powerful broadcaster in a neighbouring town picks up the message and sends it out to the listeners of Europe.

"Here is LyonslaDoua calling you from the summit of Mont Blanc."

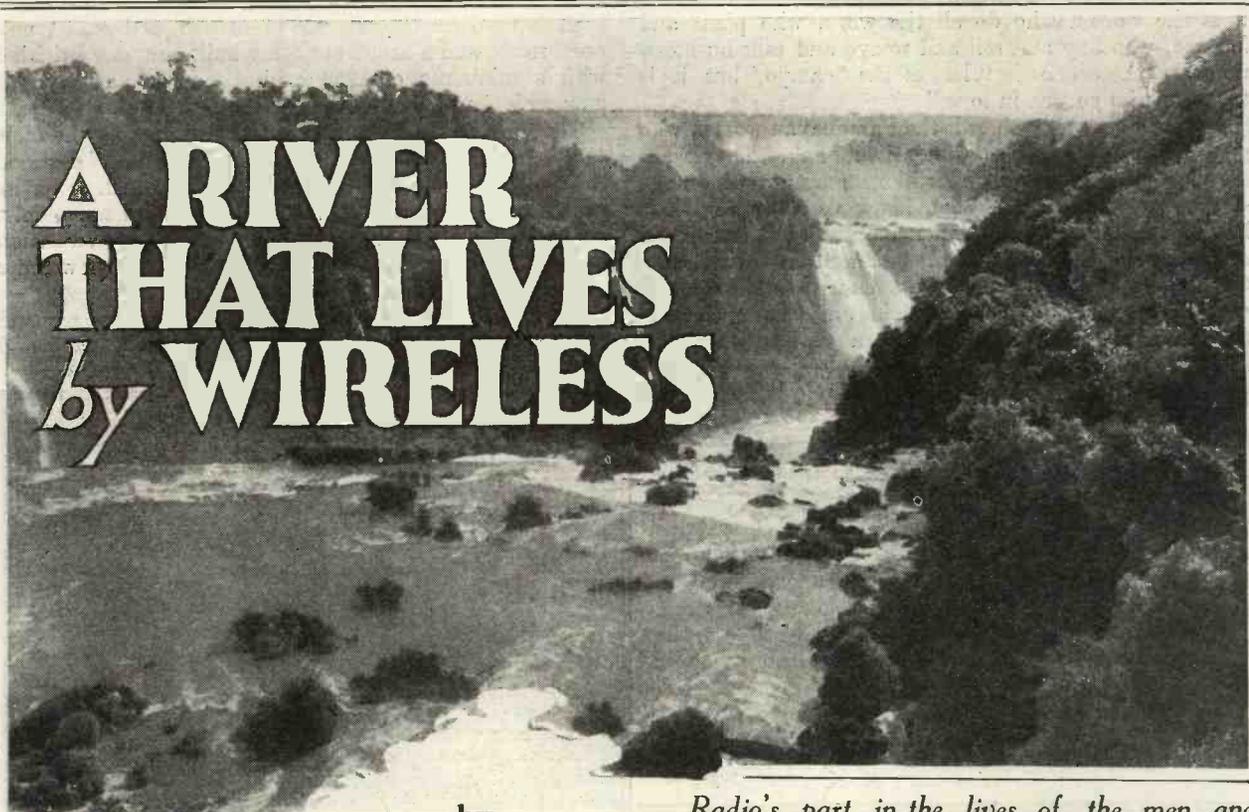
This remarkable achievement—the highest broadcast ever attempted—was made possible through the co-operation of two French guides, Alfred Couttet and Roger Roche, who scaled the mountain with a complete wireless installation on their backs. In the top picture you can see them nearing their journey's end, tired but full of enthusiasm for their unique experiment.

The aerial is firmly fixed at the mountain top and ski sticks come in handy for guying the tiny masts!

Contact is soon made with the Lyons station and you can see Couttet (in the circle below) calling up the engineers, while Roche listens for the O.K. Everything is now set for a broadcast which really is something new in O.B.s!



The broadcast is now in full swing and Couttet (whom you see above) is telling the story of the expedition. As a broadcaster he may be said to have reached the height of success!



A RIVER THAT LIVES by WIRELESS

by

R O S I T A
F O R B E S

Radio's part in the lives of the men and women of Paraguay and El Dorado.

WHEN Roosevelt, that mighty hunter before the Lord, saw the Falls of Iguasu—the home of the Rainbow—he is reported to have said: "Here is the grave of Niagara."

For countless centuries these incredible falls, two great semi-circles, divided by a spur of forest-covered rock, have been hidden in the midst of impenetrable jungle on the frontier of Paraguay, Brazil and the province of Misiones in the Argentine. To-day, by the enterprise of the Mihanovitch line of river steamers, they can easily be reached by way of the Upper Parana.

Twelve years ago, I am told, there was only one paddle-boat on the river.

Currents and rapids make navigation difficult, and for this reason, perhaps, the great, tea-coloured stream is deserted. Occasionally a Guarani hugs the bank in a canoe hollowed out of a log.

The People of the Forest

Bamboos line the water, their feathery branches like a cloud of green smoke. Macaws, screeching overhead, look like shreds torn from a rainbow. Distant deer, apparently the size of hares, creep down to drink.

An occasional jaguar may slink out of the undergrowth, or an ant-eater, overburdened by his tail, lumber after his exaggerated snout. Behind the bamboos virgin forest is plaited with creepers and seamed by the silver bark of lapacho trees before it breaks into many-coloured flowers.

Yellow, purple and red, the flattened tree-tops spreading out in search of the sun after their struggle through 80 feet of intricately woven parasites, look like trays laden with brilliant blossom.

On one side of the river is Paraguay, a gallant little country which has hardly recovered from its last five years' war against three powerful neighbours. The quite unnecessary heroism of this land-locked people, numbering at that time (1865 to 1870) about half a million, has retarded material progress for a century. When the last incredible war ended there were perhaps 25,000 men left in Paraguay to *eleven times as many women*, and most of these males were under 12 or over 60.

This was the beginning of the legend that man was a rare creature, who could not possibly be allowed to work. As for a husband, he was a jewel beyond the reach of individual ambition.

To-day, though the numerical balance between the sexes must have begun to right itself, there remains a vague idea in the masculine mind that he confers a favour on his women by allowing them to support him. Marriage does not exist in the "campo" or the forest, unless the bishop happens to make a tour, when he arbitrarily marries every couple he finds together, with the result that a thousand or two temporary unions find they have received rather more than they bargained for!

Paraguayan Picturesqueness

An old woman, sitting outside a thatched shed, in which one corner was screened with mud and bamboos to form the family bedroom, told me that her granddaughters were impatient to be married. "They do not understand," she said, rolling a vast cigar in the corner of her mouth, "how hard is the service of a man."

The Paraguayan President, who gave me an audience in Asuncion, a capital of gardens in which the houses are incidental, epitomised the situation thus: "Since

it is the women who do all the work, who plant and harvest, who buy and sell and weave and talk business, they are the economic rulers of the 'campo,' but it is the men who govern in love."

However that may be, it is the Paraguayan women who give colour to countryside and river bank. They walk bare-foot and proud, with brilliant magenta or orange skirts ballooning round them, black veils binding their hair, the inevitable cigar in their mouths, and a mountain of produce or household goods balanced on their heads. Or they ride, sideways, upon a vast tea-tray saddle covered with sheepskin and hides, a vivid umbrella opened, a child hanging on somewhere and a variety of young animals piled in their laps.

Beginnings of Civilisation

The men lean negligently against the nearest stable object, with an outside in straw hats tilted over their eyes and a reflective expression.

On the other side of the Upper Parana is first Argentine and then Brazil. In 1919, an optimist who was also an Englishman drove a road into primeval forest and induced a handful of Danes to settle along it.

Heaven knows what they first grew, or how they managed to survive at all, but these indomitables were the nucleus of El Dorado, a forest colony within a day's river journey of Iguasu. To-day there are 8,000 people of all classes and all nations living in clearings in a forest which has no known boundaries.



"When the last incredible war ended there were eleven times as many women as men in Paraguay. A husband was a jewel far beyond the reach of individual ambition." And so the women must work—while the men enjoy the products of their toil!"

They grow and make a profit out of tobacco, yerba (the bitter tea of South America), oranges, and cotton for export, as well as everything they need themselves. They have 200 kilometres of red mud roads, a cinema and several stores.

They have doctors and chemists, cobblers, saw-mills, masons, carpenters and smiths. They make bricks and furniture, build a new hotel every year, and have even reached that stage of civilisation which is denoted by a speed limit and "Keep to the left" signs.

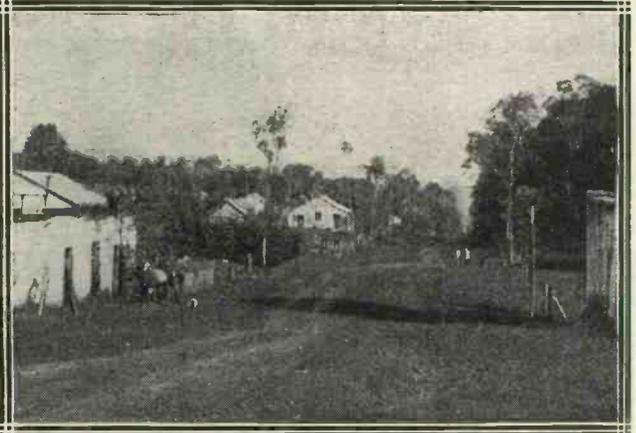
All this has happened in eight years, for, at first, progress was slow. And it has happened hundreds of miles from the last one-storeyed township representing Argentine civilisation, in the middle of rolling forests—the sort of forests which has to be cleared foot by foot with twenty-inch knives for the creepers, billhooks and axes for the undergrowth, and fire for the rotten timber.

This very year 500,000 acres of neighbouring forest have

been secured for the sole use of British settlers. A new port, roads, and a hostel are being built, and any Britisher with a minimum of £250 capital can go and try his luck with the forest.

The idea of Mr. Schwelm, who originated the now successful "El Dorado" and the new "Victoria," destined to be as English as the electrical plant which is on its way from London to light the settlers, is that no colonist ought to buy his own experience. To prevent such waste of time, experts are employed to teach the newcomer how, what and where to plant.

It will be interesting to see whether Britons respond as keenly as Germans, Swiss, Poles, Czecho-Slovaks and



El Dorado—a little colony in a clearing of the great forest which knows no boundaries. This was once the main street of El Dorado—but now "they build a new hotel every year and have reached that stage of civilisation which is denoted by a 'keep to the left' sign."

Norsemen, who have made such a success of El Dorado. So far four prospective settlers have arrived—a Cambridge undergraduate, an intelligent youth from a Belfast board-school, the son of a wealthy tobacco-merchant whose business is in Greece, and an Anglo-Argentine tired of the droughts which jeopardise farming in the South!

Where the Upper Parana River narrows suddenly from 4 kilometres to less than 100 yards, and—having hurled itself over the Guayra rapids in spectacular commotion—rushes through a gorge scarcely deep enough to hold it, there is another curious social system in the form of a vast Yerba company which employs thousands of workmen and owns in Western Brazil millions of forest acres wherein this "tea" tree grows wild.

Guayra Has a Bad Name!

Guayra has a bad name in Buenos Aires, where it is imagined to be the end of the world or beyond it, a place of shootings and knifings and all sorts of other excitements. We found it a peaceful community, well-housed and self-sufficient, a republic within a republic, where the company made its own laws and enforced them, and where a Scotch chief engineer and an Irish blacksmith ruled supreme in workshops which used only English tools!

Guayra is completely dry. Even beer is contraband. Marriage among the labourers is at a discount. Every man brings his own woman, but he may not change her in the place.

If there is any squabble about a too attractive female, out she goes! Gambling is only allowed on two days of the year; oddly enough, Holy Thursday and Good Friday. On these occasions the peons lose at roulette and faro the wages of the previous year.

There are other companies and other settlements along the smooth, tea coloured Upper Parana. The Company or the land-owner is obliged to be in the centre of what is still feudalism.

What Holds Them All Together?

He must house, doctor, educate, train and feed, or cause food supplies to be available for, the hundreds or thousands he employs. He must develop not only civilization out of the forest, but health and fitness, a social sense and a dozen other senses in the raw, half-Indian material recruited from among the Guaranis.

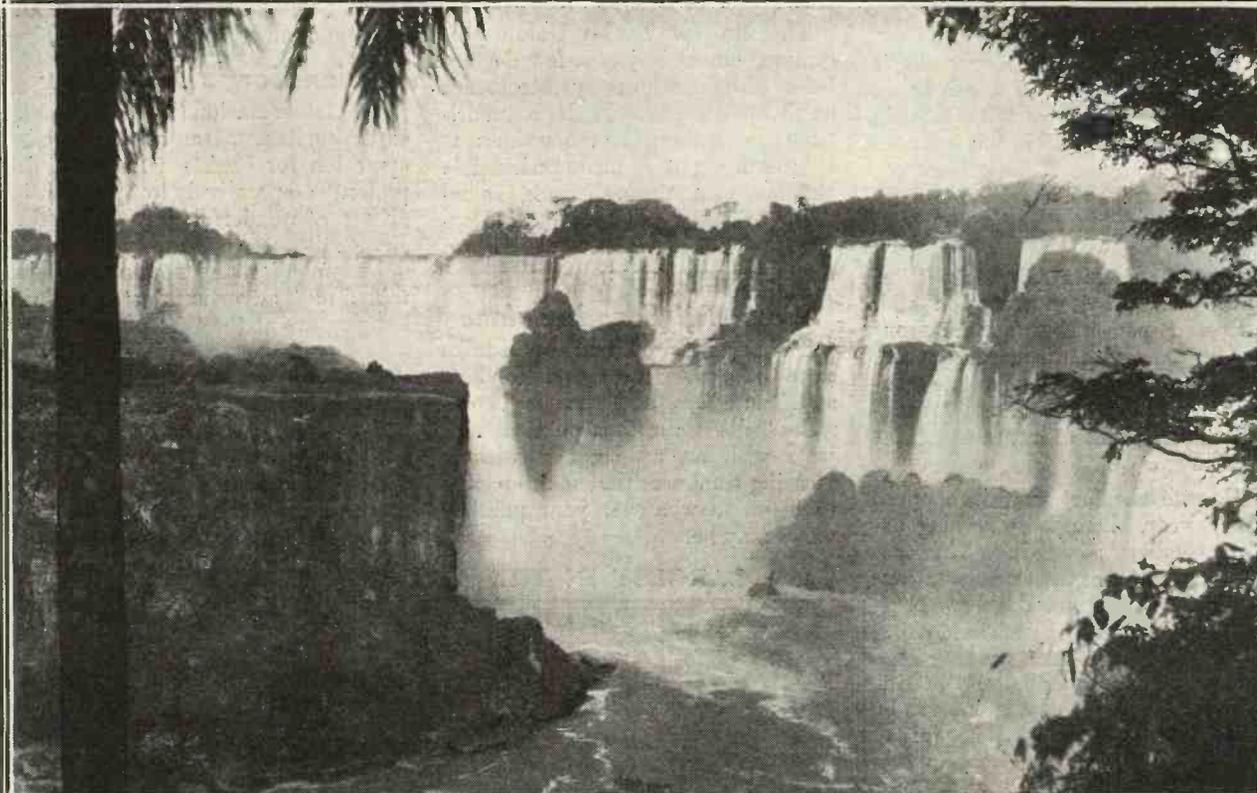
So, as we wandered slowly up-river and down-river, I wondered what held the Parana people together—the Norsemen and Central Europeans at El Dorado; the engineers and mechanics at Guayra; the French director of Puerto Bemberg's Yerba Company, who had spent

all along the river, in the most unexpected places, above wooden roofs and tiled ones, above hovels made of bamboo or the rusty sides of kerosene tins, are aeriels sagging at odd angles or half covered with the insistent forest growths.

British broadcasting is no use to South America. Our stations are too far away and are active at hours when the Southern Republics are asleep or at work. Atmospheric in the rolling forest make reception difficult, but Buenos Aires can generally be picked up.

No Licences in South America

Unfortunately, Argentine programmes lack diversity. The Upper Parana gets tired of listening to local orchestras or gramophone records of tangoes mixed up with urgent appeals to use somebody's toothpaste or somebody else's vests. There are no licences in South America,



The mighty Falls of Iguasu—the Home of the Rainbow—which Roosevelt described as "the Grave of Niagara."

half his life in an African desert; the mulattos living over the Brazilian border in beehive huts half smothered by the forest, yet electric lit from Guayra; the crews of the river-boats; the lightermen who bring Yerba from the tributaries of Matto Grosso; and the settlers or the labourers dependent on the soil they have cleared from a still resentful jungle.

I decided it was wireless. There is no other connection with the outer world. All messages go by wireless. All news and all amusement comes by it.

At Iguasú the forest stretches, unbroken and impenetrable, from the rainbow-haunted falls to the river. Suddenly, out of the middle of it, towers a transmitting station, and underneath the aerial is a heap of galvanised iron roofs, scarcely more important than any other scarlet patch in a forest erupting into flower.

At El Dorado there is another transmitting station, and

so each broadcasting station has to rely on its advertisements for revenue.

Once a week came the still, small voice of the General Electric Experimental Station in U.S.A. with a charming selection of Spanish music, dedicated in a flattering pre-fatory speech, also in Spanish, to each South American Republic in turn, which shows that North America knows the value of broadcasting as an instrument of propaganda.

The Effect of Radio

Its effect on the Upper Parana River was that of Sunday dinner to the conventional Britisher. Insects were forgotten. The forest ceased to threaten. Atmospheric miraculously subsided. Managers, settlers, lumbermen and natives relaxed according to their age into sentimental reminiscence or anticipation of romance to come.

ABOVE 1,000 METRES

News about the long-wave stations is particularly interesting now that the darker evenings are providing vastly better reception conditions. Just at the moment even the very distant broadcasting stations are arriving with amazing vigour.

IN saying good-bye to September the keen wireless man bids willing farewell to two of his greatest troubles. "Summer conditions" is the name of one of them, and "atmospherics" is the name of the other—bad luck to both of them! Enter October, and easy long-distance listening.

Getting Better!

Instead of the usual four weeks, it will be after an interval of nearly six weeks that these notes will appear in print. And not only is this a longer than usual period to look back on, but those weeks have been unusually important ones from the listener's point of view.

They have been the steep slope down which better reception slid, almost imperceptibly at first, but surely and with increasing speed, from the poor conditions of late summer to the very-good-and-getting-better conditions of autumn.

Despite the fact that it happens every year, there is something exhilaratingly satisfying in this increase in the strength of the foreign stations as the evenings get darker. Even the very distant ones, such as Moscow, arrive with an amazing vigour once we get the proverbial R in the month. (Neither oysters nor radio are at their best in May, June, July or August!)

Moscow, by the way, seems to be the centre of a great deal of curiosity at the moment. A number of readers have raised inquiries as to where his programme is to be found, some doubt on the subject being caused, apparently, by the fact that there are several Moscow stations listed on long waves.

The Moscow Stations

Whatever results may be in other parts of the country, in my own district, and in those of a very great number of listeners in the London area, there is only one long-wave Moscow programme worth tuning for. And that is Moscow Trades Union, which works on 1,304 metres.

The others—Moscow "Old Komintern" and Moscow "Popoff"—are generally and disrespectfully known as wash-outs; Komintern being a come-and-go sort of station, whilst Popoff, who is supposed to work on 1,116 metres, generally pops off for such long periods that one gets tired of trying to tune him in!

The Moscow Trades Union programme comes in just a few degrees below Motala, who relays Stockholm on 1,348 metres. It is a multi-language station, so sometimes it is talking pure, incomprehensible Russian, sometimes French, sometimes Spanish, and sometimes English. (Often, by the way, with a flavour of New York!)

Successful Scandinavians

The English programmes and talks seem to be given mostly on Mondays and Thursdays, and various "comrades" discuss serious political subjects with an ardour and with a pleasing frankness that is interesting to listen to whatever your political views may be.

The call, too, is intriguing. "Hallo, Hallo. This is Moscow calling from the radio station of the Central Council of the Trades Unions. Workers of the World, Unite!" As one would expect, the tune of the "Internationale" is often to be heard from Moscow.

With all the long-wavers that get over well in this country becoming stronger and stronger as the days get shorter, it seems invidious to particularise, but special mention must be made of two of the Scandinavians.

First a pat on the back for Oslo, which at one time was a prime favourite with English listeners, and which is now making 1,083 metres popular. And compliments to Kalundborg.

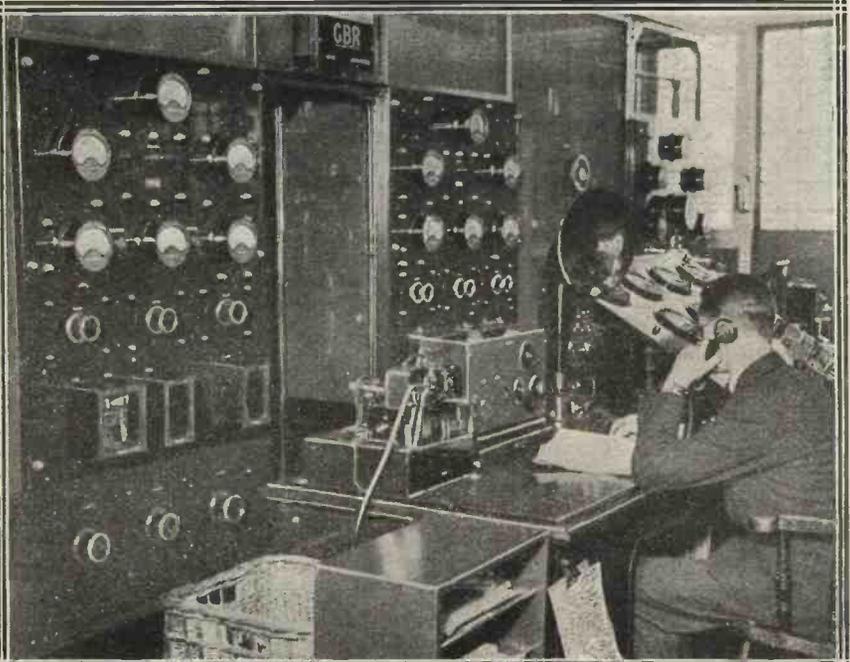
Kalundborg's Xmas Box

This latter station (1,153 metres) is expecting its new transmitter to be in operation for Christmas, but on its present comparatively low power it is giving a wonderful service to the British listener to the long waves.

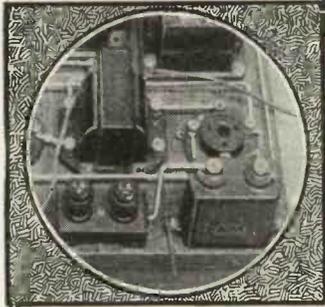
Luxembourg, the new and much-talked-of "advertisers' station" is hanging fire at the time of writing.

If there is one unpleasant aspect of present reception above 1,000 metres it is to be found on the 1,554.4 mark, where poor old out-of-date Daventry 5 X X tries to hold up his head amongst his powerful and more up-to-date neighbours!

LARGEST IN THE WORLD—AND BRITISH!

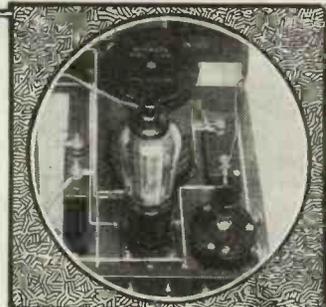


The Rugby radio station handles the largest telegraph and telephone service in the world. Rugby's ship service is worked on 18,740 metres—long waves indeed!



TUNING-UP FOR TUNING-IN

Here come the winter months! And with them many more hours of listening. Is your set ready to give you the very best entertainment value? An overhaul won't do it any harm, anyway.



WOUPP! Woupp! Woupp! Woupp! In they come, a station at almost every degree of the dials as they are swished round. That set has been tuned-up for distance—tuned-up just like a car is super-tuned for speed.

And it is just this tuning-up which makes all the difference between the set which seems to bring in every programme going, and the receiver of similar type which can only enveigh distant stations out of the ether as a feeble cacophony.

So long as a set is working somehow or other, it will give results on the locals, and most likely a continental or two will manage to get through. But there are certain things which can be done to a receiver, no matter whether it be home-constructed or commercial, elaborate or simple, which will improve its distance-getting properties out of all recognition.

Lacks That Little Something

Suppose you were confronted with a set which works right enough, but which lacks that something others seem to have got, would you know how to set about tuning it up?

Or, maybe, you have just realised what you are missing in not being able to compile a really impressive looking log—well, what are you going to do about it?

I propose to help you in the following paragraphs with a few hints on titivating a set and some advice on pulling in the foreigners. Most of them apply in general to nearly all receivers, and it does not matter whether you bought your set ready-made or built it up yourself—except perhaps in that if the latter is the case you may find yourself able to do more than if the former applies.

Smooth As Velvet

Here we are then, with the set in front of us. Where do we start? First of all a few words about reaction control.

Often you will find it stated that you cannot hope to get real distance unless reaction is as smooth as velvet, and it is suggested you should reduce H.T. volts on the detector until it is so. But, alas, how often does the reduction of detector volts fail miserably!

In many sets it seems just about impossible entirely to remove a "plop" when the set goes in and out of oscillation. But does that mean the set is no good for distance? Not a bit of it!

With modern valves, and par-

ticularly if there is an S.G. stage in the set, one should not have to push reaction right up to oscillation point. If this is necessary it shows that inefficiency is present in all sorts of odd little ways—in fact, it indicates simply that the set wants "tuning-up."

If you use batteries, I can say with almost complete certainty of being correct: "You need more high-tension." Quite 90 per cent of the battery sets are starved of their very source of life—H.T.

Feed Up Your Valves

Perhaps it is volts you lack, or perhaps capacity (referring to the size of cells used in your H.T.'s). Anyway, don't bother with anything else until you are satisfied

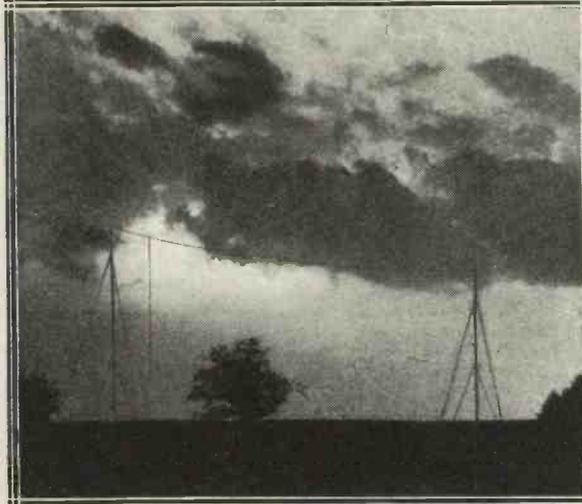
detector stage increases with the high-tension.

Now we come to the "terra firma" or earth, and the "firma" the better for all-round results! Of late years the importance of the aerial has become much less, and receivers give amazing results with the tiniest bits of wire.

Unfortunately, this reduction of the aerial's importance has led many to think it also applies to the earth. But it is surprising what a vast number of little snags are due to poor earths.

So see what you can do to improve yours. You know the usual remedies—thicker wire, shorter lead, better joint to the earthed object, water-main instead of gas-pipe, buried plate in damp soil

BETTER DAYS FOR RADIO



It's raining most days now! Soon you'll have to turn the lights on for tea and winter really will be here. But who cares? Winter evenings mean better radio—so let's listen!

about this vital, though perhaps expensive, item.

What you should aim at is to give the valves as near their maximum voltage rating as you can, except perhaps the detector, which usually wants less—although not too much less, mark you.

And don't forget to allow a little extra, perhaps a lot extra in some cases, for the drop that is bound to take place across such items as resistances, transformer primaries, loudspeaker windings, etc.

The latter is the most important of these, because the last valve, whose anode current passes through the speaker, uses the highest H.T. current; consequently the voltage drop attains more importance. Quite often at least 180 volts must be available if the valves are to get their maximum voltage of 120 or 150.

In connection with the detector valve, if a reduction of volts down to about 50 or so does not do the trick in providing plopless reaction, it may pay you to put it up higher and put up with plops. It is surprising how the mag. of the

instead of short, thin earth tube, and so on, and so on.

The firmer you "anchor" the set to earth, the better it can reach out for distance. There is nothing like a good, sound earth connection to ensure thorough stability.

And there is nothing better than good contacts and connections to ensure maximum punch. Surprisingly enough, the place where one usually finds the worst "bad connection" is at the spot where it is most likely to cause trouble.

The Worst Offenders

That is the L.T. terminals, where the tags fit under them. The largest current of any in a radio set flows at this point, and in comparison with the current flowing, the smallest voltage is extant.

The worst offenders in this connection seem to be the accumulators in portable receivers, and the reason is probably the small terminal area in use.

Of course, you want to ensure that there is good contact everywhere, not only in the actual internal wiring of the receiver,

but at all external connections. Prise open H.T. wander-plugs so that they fit tightly.

Also clean up all valve-pins and ascertain that they make good, clean contact in their holders. Make sure that every point where electricity has to flow is tight—and clean. That is half the battle of long-distance reception.

Conserving All the Volume

And now, what about adjustments and those variable factors in the set?

As a general rule, if you have a selectivity control of any sort, use it as little as possible; in other words, don't make the set more selective than is absolutely necessary.

The reason for this is because in all but very few schemes, increase in selectivity means slight decrease in volume. You want to conserve every little bit of volume you can.

As an instance, consider the variable type of series aerial condenser. As the capacity is reduced, so selectivity gets better and volume worse—or less—and vice versa. A somewhat similar instance is the tap on an auto-tapped coil, for the smaller the tap the greater the selectivity and the more loss in volume.

Another adjustment that you need to get just right is the ganging of double or treble tuning condensers. The actual procedure is largely dependent upon the circuit and condenser in use, and double gangs are easier to set than treble.

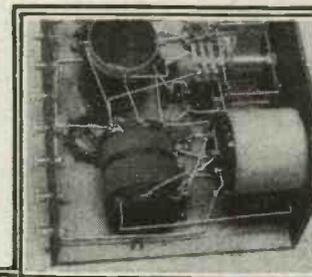
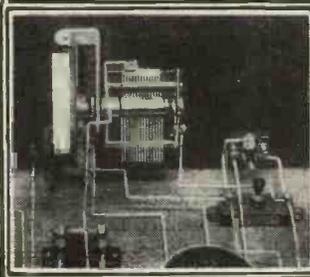
O.K. in the First Place

However, an important point to remember is continually to adjust the main knob as the trimmers are adjusted. On some commercial sets it is difficult to get at the gang condenser, and in such a case it is best left alone, because it is not likely that you can improve matters and you could quite conceivably make them worse.

And so one could go on with the items that want attention when you are tuning-up for tuning-in. The most important have been mentioned, and no doubt will be a guide to others as well, but it should be understood that the set must be O.K. in the first place.

It's no good trying to get that little more out of a set when it is working with a valve that has lost its emission.

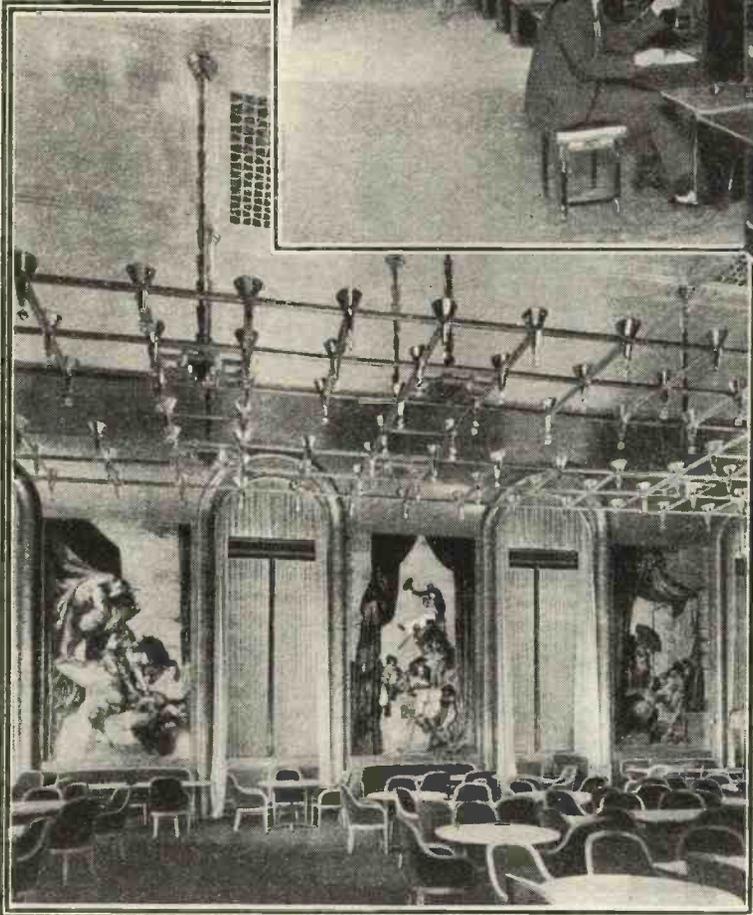
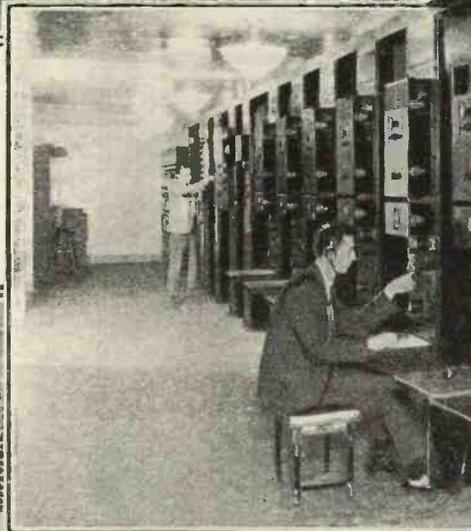
That's the final point I will mention. See that you are using just the right type of valves, and that they are O.K.—no lost emission and not too old. Always suspect very old valves until you have proved them O.K. A. S. C.





RUNNING RADIO TO EVERY ROOM!

The gentleman on the right is busy supplying a choice of six different programmes to the 2,000 rooms of the Waldorf-Astoria—New York's latest luxury hotel. Visitors in their private suites can plug-in and select whichever programme they prefer.



FOR THE Highbrow?

In the picture at the top of this page you see the hotel lounge, with a loudspeaker concealed behind a grille over the doorway. In the dining-room (seen on the left) light music is distributed from loudspeakers in the ceiling, high above the heads of the diners.

THE BIGGEST SET IN THE WORLD

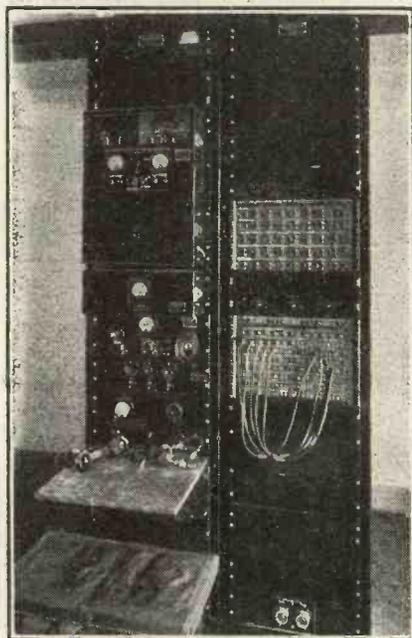
THE facts concerning the largest and most ramified radio programme-distributing system yet installed under one roof, which was brought into service in one of New York's luxurious hotels recently, cannot fail to prove of interest to every wireless fan in the world.

The Very Latest

The system is said to represent the latest step in size and flexibility, even for America. Its amplifying and distributing equipment not only gives programme distribution and voice reinforcement in the Waldorf Astoria's many public rooms, but permits an instant choice of these programmes to its guests in each of the hotel's 1,940 bed- and sitting-rooms!

The new system of distribution comprises equipment for amplification and distribution over six channels. For any of these channels the

KEEPING IT QUIET!



Here is the control board which deals with the vast system. The operator's chief duty is to manage his central control so that a programme in one room cannot disturb a guest next door!

programmes may be picked up in any of the public rooms, may be reproduced from records, or may come from distant sources by wire or through the aid of radio receivers.

Radio programmes to be placed on the channels are picked up by an antenna hung between the hotel's two towers, and thence are led down to the control-room. There the antenna circuit is coupled to six Western Electric 10-A radio receivers, one associated with each main channel.

No Interference

The input circuits of the receivers are so arranged that the operation of each receiver is independent of the operation of the others. Thus they can be used without mutual interference to detect different programmes for their respective channels.

For distribution to guest rooms, the output of each power-amplifier is connected through matching and switching apparatus to a strip of jacks, from each of which a conducting pair passes through lead-covered cable up a riser in the building to an electrical closet serving the rooms in its neighbourhood on its floor. Here the pair is cross-connected to four terminal strips from which several circuits run, each to about twenty guest-rooms.

Six pairs of wires are connected to each of the guest-rooms, and to several rooms in each of the apartments of the hotel. To avail himself of the programmes they offer, a guest requests that a loudspeaker be brought him, and the page who delivers it inserts the twelve-conductor plug at the end of its cord into the base outlet.

Six-Position Switch

By rotating to the proper position the knob of a six-position switch on the loudspeaker, any of the six programmes available can be selected. The volume of the programme can be adjusted by a control knob on the speaker.

Let us introduce to you the largest radio programme-distributing apparatus ever built.

Installed, as one might expect, in America's latest luxury hotel, it enables nearly two thousand guests to have the choice of six different programmes in their private rooms.

The master volume-control in the control-room is so set that no guest can raise the volume to a point where it would annoy the occupants of an adjoining room.

To the public rooms the sound currents pass over cable from the power amplifiers in the control-room. The sounds are reproduced by loudspeakers, the type and location of which are chosen to suit the rooms which they serve.

Owner Listeners

Apart entirely from the system distributing to guest and public rooms is the antenna service for residents of the tower apartments. It was thought that these residents might wish to use their own radio sets as well as the hotel's loud-speaker service.

For their accommodation two additional antennæ have been hung between the towers, one to serve each tower. Each antenna is coupled to a radio-frequency transmission line of low impedance through a protector, a wave-trap for suppressing strong local stations which might overload the system, and a repeating coil.

On reaching the highest floor on which apartments are located the line is coupled to a loaded line of high impedance. To this line in turn are coupled low-impedance lines, sometimes as long as 250 ft., running to the individual apartments, where the impedance is again finally stepped up.



ON THE MEDIUM WAVES



A brief but thorough review of the stations to be found between 250 and 500 metres, with some notes on where they come in on the dial and how you can easily identify them.

WHATEVER the land surveyors and cartographers may have to say about it, Europe always seems to shrink to about half-size at this time of the year!

Back at the end of August, which was only a few weeks ago, Rome, for example, was a foreign city, far, far away. But to tune in to Rome during the past fortnight has been like popping over the road to see a neighbour for a moment.

(You might find him out, it is true; but the probability was that he was just where you had hoped to find him, full of good spirits, and a

to give some information about Florence. She has one of the most easily remembered wavelengths in Europe—500 metres, to wit—and although her power is only 20 kw., she often gets over like a 100-kilo-watter!

Looks Very Small

On the wavelength above Florence's we have Brussels No. 1, situated at a mere fraction of the distance from London, and using 15 kw. But if Florence feels in form she shouts him down and makes him look very small indeed, which is remarkable considering she is nearly four times the distance away.

(It will not be surprising if Brussels sprouts a few more kilowatts in self-defence!)

Another programme which will surprise the casuals who have neglected tuning during the summer time is that from the new station at Poste Parisien. Wavelength, 328.2 metres; power, 60 kw., which is well above that of the B.B.C.'s most powerful stations, the 50-kw. Regional twins.

Poste Parisien

There are several things about Poste Parisien to be commended, including his quality and reliability, his nicely balanced programmes of "canned" and straight music, his well-timed close-down after the 10.45 news (giving one a freer dial for the really distant stuff which we shall soon be listening for), and his daylight programmes.

If you have not tried the latter, search for them any time after noon, and you may get a very pleasant surprise.

And, talking of the newcomers, have you spotted Bari? This is the much-talked-of and long-delayed Italian Regional on the Adriatic who is now feeling his way over Europe on a wave of 270 metres, which brings him in several degrees above the London National.

This new Italian station, backing up Rome and the rest of them, ensures that Italy is going to take an important place in the provision of our alternative programmes this year.

In Daylight

There is such a wide and pleasing selection of foreigners to be had after darkness has fallen that it will be better to mention the possible "daylight" merchants who, even before the sun has set, can find their way to our tuning dials. After dark, of course, they tend to behave like locals!

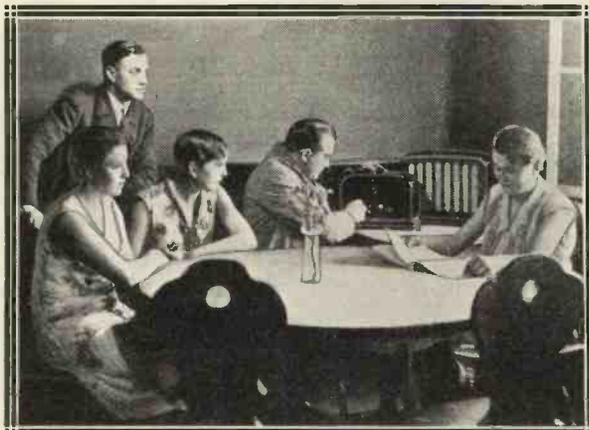
Foremost among this sturdy crowd we find Fécamp (Radio Normandie), on 223 metres—or, rather, in the neighbourhood of 223, the volatile Frenchman having a somewhat roving disposition!—Hilversum (296 metres); both the Brussels stations at times; and Langenberg on 473 metres.

Old Friends Look In

Poste Parisien has already been named, and this does not exhaust the daylight possibilities on medium waves, for such old friends as Heilsberg, on 276 metres, are now liable to look in any afternoon, if only for half an hour.

Of the other Germans, the new Breslau and Stuttgart (once known as "Mühlacker") are both worth watching for, the former being so newly arrived among us that it is probable that power increases and so forth are still being made by the engineers.

A REAL FAMILY AFFAIR



An occasion on which the children do not mind being seen and not heard. Father tunes-in on the loudspeaker while mother prepares the family for the treat in store for them!

very good companion to while away half an hour with.)

Those Italians certainly seem to know how to put it across! Trieste, down near the bottom of the dial on 247 metres, has been a perfect marvel for strength on some occasions; whilst sister Florence has been in wonderful voice at the top of the dial.

Florence Calling

As a concession to those wanderers from the wireless fold who don't do any long-distance listening until the winter gales and storms remind them of their radio sets, it may be as well



THE other day a friend took me up to one of the twin studios at the Prague programme centre, and we were provided with *carte blanche* to sit through the programme or go down to the transmitter as we wished.

It was Saturday evening, and at 9.30 the main programme started. It was a concert of the Sandler or Tom Jones variety, conducted by M. Spot, a popular Czech musician.

We kept our seats for the solo items, and during the full orchestral broadcasts we went into the little announcer's room and heard the programme through the pilot speaker. Two microphones were hanging up in the studio outside, but only one, a condenser "mike," was being used.

Programmes at Leisure

When the concert finished, and the "mike" lines were switched over for a relay from the Smetana Hall in the city, we left the studios and went along to the transmitter itself. There on the check receivers we could follow the rest of the programme at leisure.

We went up from the heavy machinery on the ground floor to the second storey of the modern little building, and this is where we first met the panels which spell the radio side of Prague.

Downstairs the noise of the humming converters was considerable. If you have ever been on a trip round an electric power station you will know the kind of noise I mean.

Black Panels of Prague

But immediately we ascended the metal staircase, and shut the soundproof door leading into the offices and transmitter room, the high-pitched humming was practically cut off.

We were conducted through the Chief Engineer's office and the writing-room, to the big room

SATURDAY NIGHT IN CENTRAL EUROPE



Our Special Correspondent invites you to come and spend an interesting and amusing evening with him at the Prague Broadcasting Station. He will take you through the studios, introducing you to some of the chief personalities of Prague, and from there you will adjourn to the control room and see the programme actually going out. In fact, a very jolly Saturday evening.

an ordered calm about the transmitter hall and the control-room which shows that the men on the spot are inspired with confidence.

Way back in the Prague studios the news bulletin and miscellaneous local notes are being given.

Nothing to be Heard

When we first entered the transmitter room, the only sounds heard were the buzzing of a dozen different transformers or power-choke cores, and the clacking of water-valves. The needles of the meters on the modulator panels were jumping up and down in accordance with the announcer's speech, but not a word was to be heard.

An engineer walked quickly across to a monitoring panel, switched on a bank of accumulators, and plugged in a quickly-checking

turned, bringing in the relay at full strength.

Anxiously the control engineer watched the modulation meter. The line from one station to the other is a long one. There are tone correctors at a number of points, and it is a tricky job for the men at the station to keep the programme volume up to the same level as that from the local Prague studios without causing overloading peaks.

A Wise Plan

The engineer left the control-room, went to a little ante-room off the Chief Engineer's office and switched on a mains-operated set which can pick up the Brno relay. Brno was giving its programme through its own relay transmitter on 300 metres, and the engineer thought it is a wise plan just to check up the depth of modulation by listening-in. It provides a quick check in case there is anything wrong.

A programme official phoned through from the studios to know if it would be possible to give the closing-down sign from the station, as they wanted to use the main Prague studio for a rehearsal of a big orchestral concert to be given the following day.

Back Home Again

The station had to switch back to the home studios for the second news bulletin at 9.20, and then there was a little more serious work for the engineers as they switched over to the Moravská-Ostrava line

for the studio performance of a little one-act comedy, followed up by orchestral music in the same studio until closing-down time.

After the news bulletin, one of the station engineers phoned back to say that the home studios would not be needed after the Moravská relay, and that the programme people could go ahead with their rehearsal.

Going With a Swing

Moravská was tuned in, as was Brno. The line was working well. The control man sat back with a smile and switched on the side-tone set again, so that he, too, could enjoy the programme.

The announcer-cum-studio director is a good fellow, and he could be trusted to handle the programme without a hitch. The converters were running steadily. The whole station was going with a swing.

Old-World "Adieu"

The closing-down time came all too quickly. The little emergency studio at Prague was switched on. A control engineer went along to this room, which is also on the first floor, switched on the light and pulled the sound-dampening curtains. The carbon microphone was switched on to one of the test amplifiers and the control man tapped it softly on the side. His assistant touched a buzzer button to show that all was well.

The control man assumed an announcer's tone. "Halo Radio-Praha vysila a preje svem posluchacum doma."

He gave the old-world *adieu*. Swiftly he left the emergency studio and went back to the monitoring panels where the other engineers were busy switching off. It is a long job. It is not like switching off a receiver.

And So To Bed

Switch bars were pulled which cut off the 15,000 volts high tension. The little grid-bias and filament generators were next switched off and, as their high-pitched note died away to a low hum, the rotary water-pumps were slowed down, bank by bank.

Not till about half an hour after the good-night call could the Chief Engineer throw out the main power switch and definitely put Radio Prague to bed!

An evening full of incident, you will say. But for the engineers, the control men, the announcers and the station director, this Saturday night was but typical of "the day's work."

THE INVENTIONS OF TO-DAY—



Prague is fortunate in possessing a control room which, in point of efficiency, layout, comfort and size, can hold its own with any in Europe.

around which on three sides are the black panels of Prague.

A striking thing is that there is really no sign of the enormous radiation. Two hundred kilowatts are flashing out into the ether, and millions of listeners all over Europe are depending on the programme.

In Constant Attendance

Meters on some of the rectifier panels show the huge voltage of 25,000 D.C., at which the power transformers are working, and a man is in constant attendance at the input side of the transmitter, the finishing point of the pylons carrying the 15,000-volt power cable across country to the broad caster.

The slightest fault on these lines, which would mean a station breakdown, is controlled by the engineer at the input panel. Another man regulates the big rotary pumps which circulate the valve-cooling water, and a stoppage of which would mean disaster.

And yet, in spite of it all, and in spite of the huge voltages, there is

side-tone set. A cone speaker flooded the room with the news bulletin.

Returning the Compliment

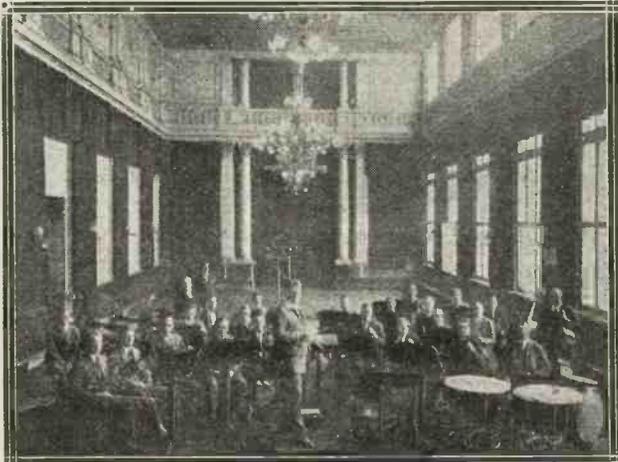
"Halo! Praha! Dany a panove, slyseti jste nymi uslyseti," said the announcer, opening the new programme, and the third engineer, in charge of the control-room, swiftly turned a control on the microphone landline circuit. Then he went to one of the Post Office-like switchboards which control the link-up all over the country for all stations, such as Brno and Moravská-Ostrava, taking the Prague programme.

As a matter of fact, the compliment was to be returned. Prague was switching over for an hour to Brno, where there was a special concert.

A test signal was put through on the line from Brno to Prague, and the announcer at the Brno end gave the "ready" call.

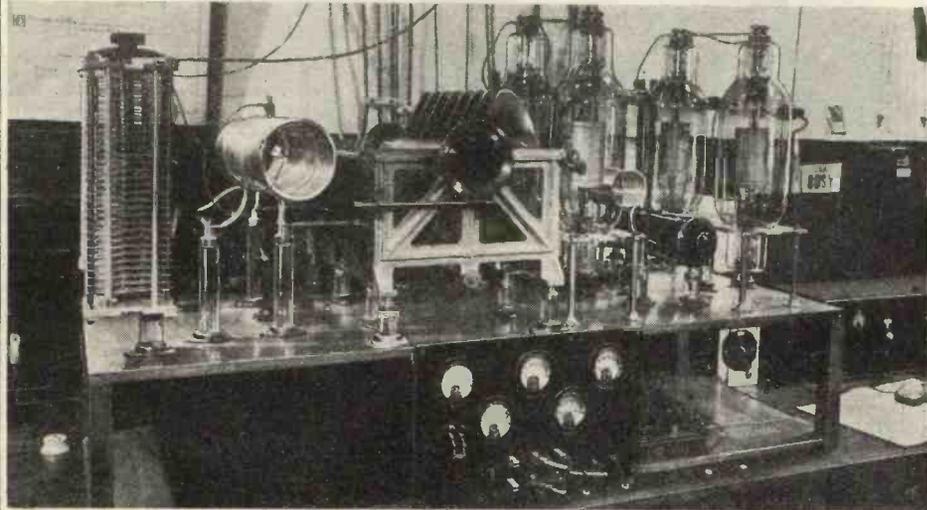
Just as he started his announcement the master potentiometer across the Brno line was slowly

—IN AN OLD-WORLD SETTING



The main studio at Prague is a fine example of how the architecture of yesterday may be adapted to the needs of to-day. The hall, with its hanging cluster of lights, its pillars and its carved ceiling, might well be the ballroom of some eighteenth-century palace.

SENHOR SANTOS' STATION



A VERSATILE GENTLEMAN!

Portugal is an odd country in many ways, but probably its oddest characteristic is the fact that it has no official broadcasting station, either State or commercially owned.

Consequently the people of Portugal have to depend upon the enthusiasm of their amateur transmitters to provide them with a national broadcasting service.

You have all heard of CT I A A, the Lisbon transmitter. Senhor Abilio Nunes dos Santos is the man who owns the station, maintains the transmitters, and provides the programmes—all at his own expense.

THE MOD-EST "MIKE"

No. 2 studio at Lisbon (you can see it on the left) is used for small orchestras, concerts and plays. Contrary to usual practice, the microphone is hidden away modestly in the corner, but it manages to pick up anything that is going on.

SHORT WAVES AS WELL

In the top picture you can see the apparatus which is used for the short-wave transmissions from CT I A A on 31.25 and 42.9 metres.

It comprises a push-pull, tuned-plate, tuned-grid transmitter with a power of 2 kw. in the aerial. Its results are most successful.

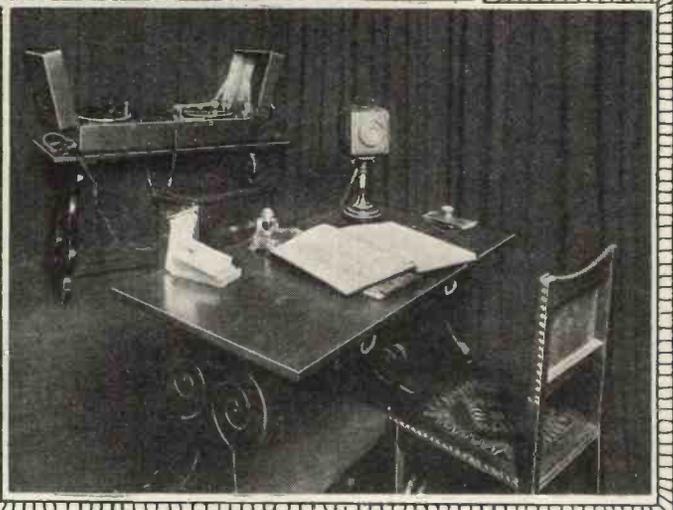


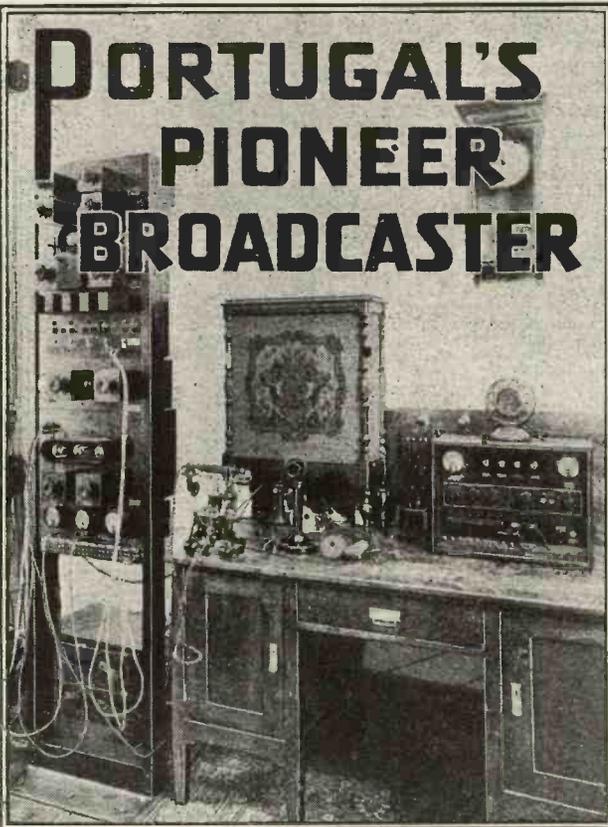
TIMELY RECOGNITION

The severely furnished room which you see on the right is No. 1 studio, used for talks, news, and the ubiquitous gramophone record.

Senhor Santos designed it all, and he was recently decorated by the Portuguese Government for the service he has rendered to the community by enabling it to listen to broadcast programmes.

No one will grudge him this well-earned honour.





PORTUGAL'S PIONEER BROADCASTER

Some interesting facts about C T I A A, Lisbon's privately-owned broadcasting station.

C T I A A is situated in the residential district of Lisbon known as the "New Avenues." The "station" is divided into two distinct portions: (1) the two studios and the control-room, on the ground floor of a house in the Avenida Duque d'Avila, No. 86; and (2) the transmitters, situated in the house of Senhor Santos at Avenida Antonio Augusto de Aguiar, No. 144, some four hundred metres away from the studios.

The studios are not large, being compartments in a flat. But they are very well arranged and fitted to give the best possible results.

No. 1 studio is the smaller, and is used for talks and programmes of gramophone records. Microphones of the most modern type are used, and are produced by the Radio Corporation of America. They are of the condenser-valve amplifier type, using 200 volts on the plate and 6 volts in the filaments.

Cutting Out the Trams

Number two studio is the larger, and is big enough to hold an orchestra of twenty-five players. It contains a piano and an organ, and the system of lighting is such that in no part are shadows cast. Here, also, R.C.A. microphones are used.

Connection between this control room and the actual transmitter is by overhead line. It was this line that provided one of the most serious problems of all on the occasion of the increase in the power of the transmitter to 2 kw. some short while back.

To avoid unwanted noises (electric trams pass the door of the studio) a special line was put up by the Anglo-Portuguese Telephone Company, which was called in to find a solution. A steel cable, supported by wooden posts, carries an armoured multiple-strand copper cable.

C T I A A has four wavelengths, viz.: One medium wave (282.2 metres), and three short waves (31.25 and 42.9 metres for broadcasting, and 21 metres for telegraphy).

The aerial for medium-wave broadcasting is of the prismatic type, while for short-wave transmission three aeriels of the Hertz type (a form of "T" aerial) are used. The power of the transmitters is 2 kw. aerial.

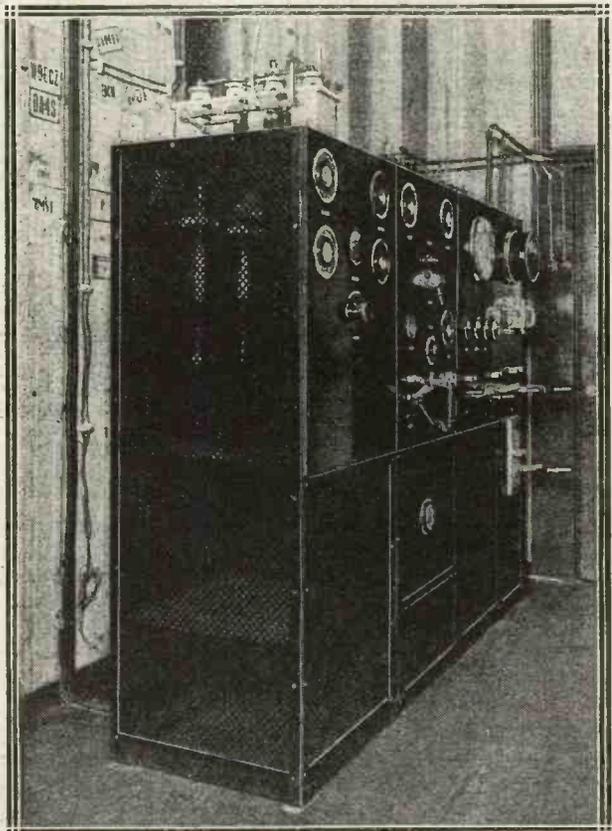
The medium-wave transmitter is composed of four parts, the first containing the various lead-in cables, distribution and measuring instruments, controlling the current from the mains (110 volts), which is A.C. The second contains the Kenotron rectifiers, transformers for filament current, and instruments necessary for the control of same; the third houses the modulating system; while the fourth block contains the "Hartley" oscillating emitter.

Permanent Outside Lines

The broadcast transmitters are linked up with a system of relay lines, some being permanent, rented from the Anglo-Portuguese Telephone Company. Five permanent lines exist—three to theatres, one to the principal salon of the Portuguese Geographical Society (where important conferences are held), and the fifth to a large studio in another part of the town (Studio No. 3, capable of containing large bands, choirs or choruses of 100 performers).

While the medium-wave transmitter serves Portugal and the neighbouring fringes of Spain and France, the short-wave broadcast transmitter has been heard in all parts of the world.

ON THE MEDIUM WAVES



Lisbon's medium-wave transmitter, which works on 282.2 metres, is laid out on the American plan. It has a power of 2 kw. in the aerial.

ARE SHORT WAVES WORTH WHILE ?

A DISGRUNTLED correspondent has stated recently, in no uncertain language, that in his view short-wave receivers are a complete "wash-out" as a source of entertainment, and that, apart from a number of Morse transmissions, he has failed utterly to pick up anything of interest in spite of hours and hours of dial-turning, spread over some time.

So serious an indictment of the short-wave receiver as an adjunct to the ordinary broadcast set is likely to be extremely misleading, and may conceivably deter many from experimenting in a highly interesting field. The danger of this is all the more real in that the criticism is plausible and contains an element of truth.

Old Friends Vanish

The fact that many of the old friends gradually fade away with lengthening daylight, and that others will be marred by increasing static, is all the more reason for considering seriously what programme value may be had within a range extending from about 15 to 60 metres.

Turning the clock back to one evening in 1925 would reveal, amongst other things, a couple of "Pirates" operating a two-valve "reflex," whose output was fed into a loudspeaker with a perfectly straight-line characteristic—at least, the works were screwed on to the end of a conical tin trumpet with perfectly straight sides quite 11 in. long.

On this particular occasion Aberdeen was fading badly, Hilversum was disappointing on account of static, and "Radeeo-Roma-Napoli" did not exist. A yawn or two was stifled. Conversation presently touched on American stations: What did it feel like to pick one up direct?

A Ramshackle Disgrace

It was supposed to be easy on the short waves: could one try? Eventually a one-valve circuit was rummaged out from a pile of old periodicals and the junk box examined hopefully for spares. About an hour later a ramshackle disgrace to any test bench had come into being and was ready to switch on.

Briefly its specification was as follows (the severe limitations of the junk box will be readily apparent):

- 2 Foreign-made very-variable tuning condensers, nominally rated at .0005, innocent of slow-motion device but fitted with extemporised extension handles consisting of rubber-ended wooden "darts," such as are

Readers who have been reluctant about starting on short-wave reception will be reassured by the experiences told in this article. Without costly apparatus and with moderate skill, the short-wave listener can have the thrill of hearing programmes from all over the world—programmes which he has never thought of before.

fired from a child's spring gun. These stuck on to the centre of the dials by suction, but had a nasty habit of dropping off in the middle of a ticklish bit of tuning.

- 1 Grid leak of indefinite value.
- 1 Grid condenser, very rare specimen, maker unknown.
- 1 Home-made coil, which, in default of anything better at hand, consisted of a few turns of heavy-gauge brass picture-wire wound round a 3-in. plywood former.
- 1 Aerial tap, for which purpose an old tie-clip came in handy.
- And, last but not least—
- 1 Osram "R" valve, 1923 vintage, possessing remarkable illuminating power.

Those who know why "Pie-arc-cubed" (or should it be IS cubed?) may be tempted to ask superciliously what about screaming, short-wave chokes, three-speed hiccoughs, and the like.

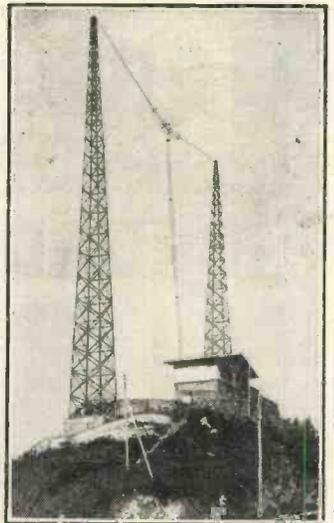
The answer is that at that stage of the proceedings there were none. And, anyhow, such matters would be

and presentable receiver. True, it still boasted only one valve, but in those days valves cost as much as a whole set would to-day.

Later a second valve was added and, eventually, a third, turning it into a straight detector—2 L.F. circuit, battery operated. With this outfit really good reception was possible, manipulation simple and restricted to two slow-motion dials, and body-capacity effects negligible. A subsequent change over to D.C. mains for high-tension supply had no effect on stability, whereas the extra volts available had a good effect on quality.

Twice Across "The Pond"

Perhaps one of the funniest experiences from the point of view of a London listener occurred one night. It was nearly midnight, and the Savoy Orpheans were being relayed by W 2 X A D. It had been rather amusing to alter the tuning by about three degrees, thus changing over from 5 S W, twenty miles away, to W 2 X A D, and hearing



Company, Inc., of New York. This company manufactures "Hallo, New York! This is San Francisco calling" and so on, till a vicious atmospheric cut him out.

The fates were bountiful that day, for later on another coup was made: "Hallo, New York! This is San Francisco calling" The silent listener this side got busy with his tuning dial and presently located "Hallo, Frisco! Pittsburgh answering you"

The doubter may object that such results are in the nature of freakish receptions, or that exceptional skill is required to tune them in. Let it be conceded that a good deal of what is picked up is fortuitous for want of reliable working schedules, but herein lies half the charm. The listener never knows whether he will spend ten minutes running round the dial to find nothing, or whether he will be plunged into romance in a matter of seconds.

Commonsense Needed

As regards operating the set, a certain amount of common-sense is necessary, and it is desirable to make oneself proficient at tuning-in a given programme on the ordinary broadcast band before tackling the short waves. On the other hand, it will probably be found far easier to tune in W 2 X A D than to separate Hamburg from Brookmans Park, 15 miles from the latter. As for Königswusterhausen, probably only a favoured few can receive his signal nowadays clear of Radio-Paris on one side and 5 X X on the other; whereas Zeesen, his Lilliputian brother, is an excellent daylight signal during the summer months, easy to get at good strength and often entirely free from atmospheric at times when the upper wavebands are fizzing and banging from end to end.

Then there is Rome, the Vatican station, Prague, Barcelona, Lisbon, Paris, Madrid—all of which broadcast regularly and can be depended upon to provide reliable signals given reasonably good conditions—to say nothing of a number of English and Continental amateur transmitters who work regularly on Sundays in the morning and early afternoon.

From amongst such a selection, which is by no means exhaustive, the listener will find no difficulty in choosing a number of alternatives to his "local" when distant reception on the 200-500 and 1,000-2,000-metre bands is poor during the long summer days. B.Q.P.

"HAND ME THAT MICROPHONE!"



Measuring only a couple of inches in diameter, and designed for wear in the lapel of a speaker's coat, this tiny microphone is supposed to help after-dinner talkers to be less conscious of their unseen audience.

of trifling importance compared with the fact that when at last the seance broke up, and the tobacco smoke had dispersed, two enthusiasts retired to bed bursting with pride at having learned at first hand that that baffling conglomeration of vowels and consonants spelled "Schenectady" is pronounced "Skennectaddy."

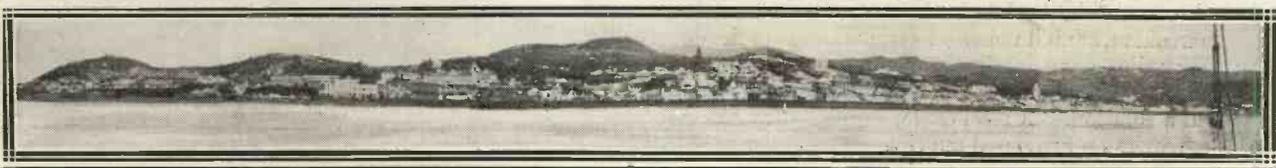
In addition, the room had been filled with some of the most blood-curdling howls, squeaks and plops imaginable. But not before the possibilities of a short-wave receiver had been revealed.

The next few weeks were devoted to acquiring some good components and constructing a more orthodox

the same programme after it had crossed the Atlantic twice.

Presently, midnight began to strike, and the tuning was left on W 2 X A D. A few seconds after the last note had died away a VERY nasal voice broke the silence:

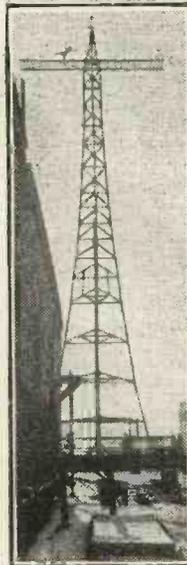
"This is Hiram P. — announcing from Schenectady. You have been listening to a relay from Chelmsford, England, of the Savoy Orpheans Band playing in the ball-room of the Savoy Hotel, London, and at its conclusion you heard the famous clock, Big Ben, chiming midnight London time. Now, folks, we are switching you over to our New York Studio for a programme sponsored by the Longine Watch





STATION INFORMATION

There's always something happening at those foreign stations. It may be a change of wavelength, an increase in power, longer programme hours or the like. But whatever it is, the long-distance listener will find news of it in these monthly notes.



OHIO. The new super-station projected by the Crosley Radio Corporation will work on 420 metres. It will be America's biggest station.

REALTOR. The site at Realtor for the new Mar-seilles station has not yet been officially handed over to the Ministry of Posts, Telegraphs and Telephones (P.T.T.).

OSAKA. The Osaka station, JOB K, now gives daily Esperanto talks at 10.30 p.m.

BARI. The new Italian station on the Adriatic has been getting over well on 269 metres.

KONIGSWUSTERHAUSEN. Since the recent reorgani-sation of Germany's broad-casting, consequent on poli-tical developments, Konigs-wusterhausen has become the "official" German station from which Govern-ment announcements are made.

BRITTANY. The site for the new Brittany station to serve Western France has been selected at Thourie, near Rennes.

Broadcasting the Weather—Linked by Radio—New Studio for Hilversum—Rio Wants Reports—Milan to Work with 50 Kilowatts.

HILVERSUM. Early next year Hilversum will open a new studio building. It will have a concert-hall capable of seating 500 people, with film facilities and cinema organ in addition to its broadcasting equipment.

VATICAN CITY. The final words of the closing announcement are: "Laudatur Jesu Christus."

GRAHAMSTOWN. The African Broadcasting Company and Postmaster - General have been negotiating for the

cating with Europe and the U.S.A. will be fitted with auxiliary apparatus for broadcasting.

W 8 X K. This station now works from new trans-mitters at Saxonburg, Penn-sylvania.

The following are the wavelengths used:
 13-92 m., 12.30-17.00 daily
 19-72 " 12.30-20.00 "
 25-27 " 21.00-03.00 "
 48-86 " from 20.00 onwards.

MAGYAROVAR. A new relay

with a view to the establish-ment of a high-power station (150 kw.) It should be working next year.

BRESLAU. During the recent political disturbances in Germany an attempt was made to set fire to the Breslau station.

LANGENBERG. The famous German station at Langen-berg was in danger of being put out of action recently by an attempt to overturn one of the masts.

LENINGRAD. During 1933 the Soviet Union reckons to build 440 new broadcasting stations, with an aggregate power of 380 kw.

KIEV. A 100-kilowatt station is under construction at Kiev.

NAUEN. The American claim that Nashville's 878-ft. mast is the tallest in the world is disputed by Nauen, Germany, which has two of 880 ft.

RIO DE JANEIRO. The Radio Club of Rio de Janeiro would be glad of reports on any of their programmes broadcast on 31.58 metres and received in this country.

HESTON. The principal weat-her forecasts on 833 metres are timed for 08.30, 10.30 and 16.30 G.M.T.

BERLIN. Certain of the German stations have been broadcasting an experi-mental long-term (ten days) weather forecast on Tues-days and Fridays.

The November **MODERN WIRELESS**
 WILL BE
ON SALE NOV. 1st. Order Your Copy Now.

erection of a station at Grahamstown.

PARIS. Relays from the Paris Opera House via P.T.T. stations include "Der Rosenkavalier" on October 8th and October 30th.

MILAN. The last of Italy's high-power stations will be erected at Milan. The power will be the same as that of the B.B.C. Regionals—50 kw.

SHANGHAI. China's new "Beam" radio-telegraph stations for communi-

of Budapest has been opened at Magyarovar.

CAPE TOWN. A new station is to be provided as the result of listeners' complaints about poor reception.

RADIO-PARIS. Summaries of the forthcoming programmes are given three times a day by Radio-Paris—at 7.45 a.m., 12.30 p.m. and 11 p.m. The early morning summary on Sundays will be timed for 8.30 a.m.

SAIGON. The recent close-down of this popular station was due to the grant from the French Government being discontinued.

NICE. The first of the new French Regionals to come into action under the General Ferrie plan will probably be the 60-kilowatt station at Nice.

MADRID. A power of 120 kilowatts will be employed by the projected Madrid long-wave station.

ROUMANIA. The authorities are testing various sites



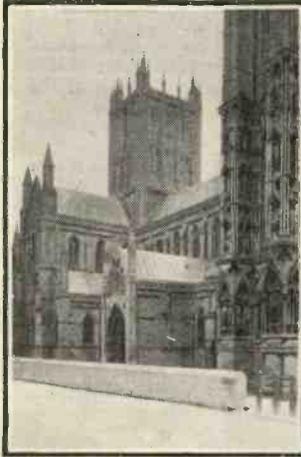
MEDIUM-WAVE reception has been extremely good recently and several American stations have provided good signals. European stations having been coming in at phenomenal strength, and daylight reception of the more distant of them has been a regular occurrence.

Besides the more usual stations such as Brussels No. 1, Langenberg, Poste Parisien (Paris) and Fécamp, less frequently heard (during daylight) stations such as Rome, Florence, Beromunster, Radio Toulouse, and Mühlacker have provided good signals as early as mid-day.

Plenty of Variety

During the evening the band seems alive with stations and there is plenty of variety for those undesirous of listening to the British stations. The top end of the dial (above Northern Regional) is particularly interesting.

Here we find Florence and Palermo representing Italy at excellent strength. Prague is, of course, the "big noise." Budapest, Vienna, Munich, Ljubljana and



WHAT THE DISTANT STATIONS ARE DOING

other stations in this region have all been heard at excellent strength.

Below 480 metres reception has been equally good and it is extremely difficult to say which stations are the better received. Beromunster simply "rips the ether," but Rome is almost as powerful. Poste Parisien (Paris) is probably the most powerfully received station below the London Regional transmitter.

It is an extremely interesting fact that European stations are being (and have been for several months past) received at good strength as far away as New Zealand and Australia.

At first one is inclined to look upon this reception as being "freak," but from the regularity with which it takes place it is clearly nothing of the sort.

Britain Seldom Heard

Those stations best received in these dominions are Rome, Moscow-Stalin, Lwów, Bratislava and Radio Toulouse. The British stations are seldom heard.

Although there is no other country with so many ardent distance enthusiasts as has the United States of America, it is an extremely rare occurrence for reports of European stations received there being made. Peculiar though it may seem, New Zealand, Australian and Japanese stations are frequently received, even in the Eastern states.

Returning to our side of the Atlantic we have a pleasant surprise awaiting for us, for the American stations are returning from what should have been their summer vacation.

Volume Increases

Besides more stations being received than a short while ago, volume has also increased considerably, and it is now possible to receive several of them at

reasonable — indeed, on some occasions, good — phone strength.

I had a most successful night in this sphere recently. At one o'clock on that morning I sat with headphones to my ears, turning the dials and feeling that I was wasting my "beauty sleep," for, so far, I had not heard a sound from across the Atlantic.

However, having sat up so late it occurred to me that I should not throw up the sponge thus early, and so I turned over to my short-wave receiver for a refresher.

Here, if nowhere else, I was able to receive America at entertaining strength. Several American stations provided me with entertainment until about 2 a.m. Then I returned to the medium waves.

I was immediately conscious that things had livened up, and I swung the dial down towards 282 metres.

Listened with Pleasure

I was just in time to receive the tail-end of an announcement from WTIC, at Hartford, Connecticut. Volume was far greater than I had anticipated and for some time I listened to the programme with pleasure. However, I soon thought I would see whether WPG, Atlantic City, was coming in, and so swung below WTIC with the idea of searching for this station.

I did not need to search, however, for WPG was coming in at strength almost equal to that of WTIC. This despite the fact that WTIC employs a power of 50 kw. and WPG of merely 5 kw.

Short-wave reception has been surprisingly good and, as could be expected, W-2 X A D, Schenectady, and stations around that wavelength, have provided some of the most powerful signals. W-2 X A F, Schenectady, and W-1 X A Z, Springfield, have also



provided excellent signals. Consistency has, however, been lacking from them.

The 49-metre band has been hopeless — so far as distant stations are concerned — until after 1 a.m. Volume has then been good until about 6 a.m., when a fade-out generally begins to take place.

A Star Station

Several South and Central American stations have provided good signals. The "star" of these stations is P R X A, Rio de Janeiro, on 31.58 metres. This station has been broadcasting nightly bulletins of Brazilian news in several languages, including British. Volume has been good, whilst the consistency with which I received this station earlier in the month was astounding.

L S Y, Buenos Aires, has provided the greatest volume of any American station (North or South). This station works upon 14.47 metres. Another Buenos Aires station, L S X, has also been heard well. Y V Q, Maracay, Venezuela, has been received at fair 'phone strength on two occasions.

L. W. O.

THE curious reader who wishes to explore this section of the waveband, with a set that reaches up to less than 600 metres on medium waves, and to 1,000 metres or so when its switch is over to long waves, may wonder whether there is an easy way to do so. There is, and it involves the use of two of those handy little compression-type semi-variable condensers for which so many assorted uses have already been found.

Easy Alterations

All that is necessary is to fit one of these condensers having a capacity of .0002 mfd. or thereabouts across each tuning condenser by means of a couple of short, flexible leads. First adjust the extra condensers in the all-out position, when the readings of the medium-wavelength stations should

A LITTLE-KNOWN WAVEBAND

How to enjoy the thrill of exploring between 600 and 1,000 metres.

be normal. Tune in a well-received station near the top of the dial — North Regional, for instance. Then increase each extra condenser's

RADIO IN JAPAN

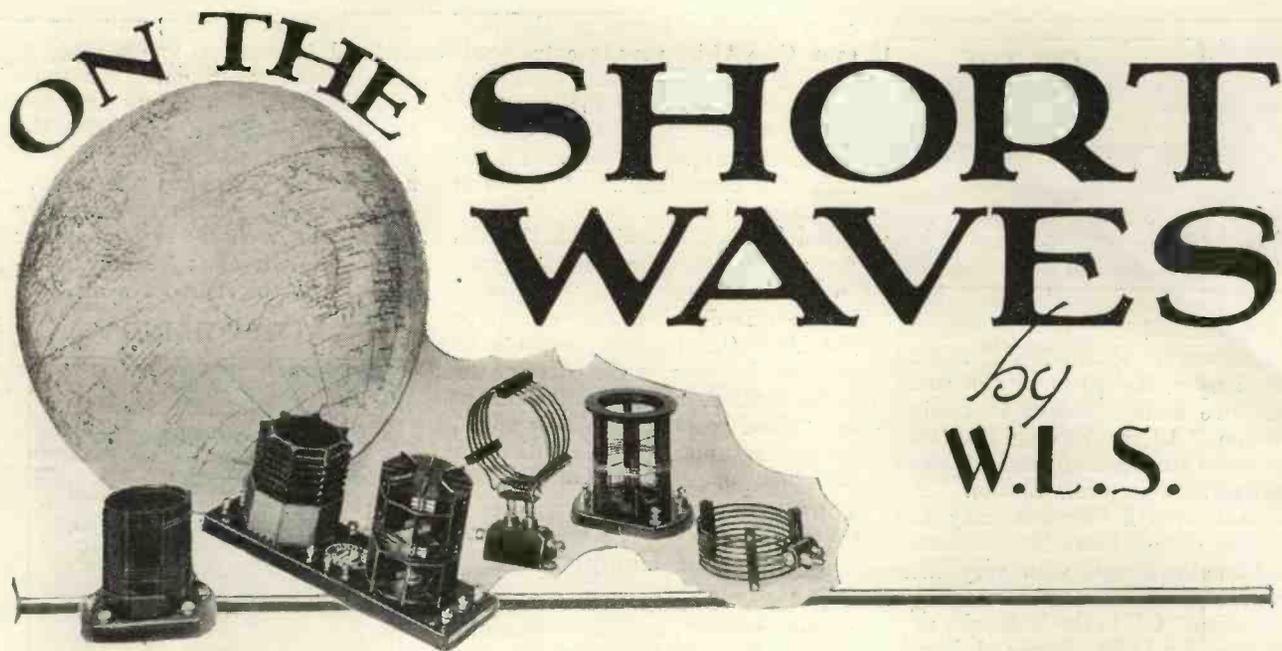


They do themselves well in Japan, as this photograph of the magnificent station buildings at Formosa clearly shows!

a degree or two at a time in this way, the extra condensers' capacities are all-in, the dial reading of the hitherto top station on the dial will be well down towards the middle.

Likely Stations

Then the extra condensers can be left alone and the top of the tuning range explored. Likely stations are Wilno, on 563 metres, and Ljubljana, the Yugo-Slav. This latter works on 2.5 kilowatts, as compared with Wilno's 16 kw., but comes over to Britain well in autumn and winter. Wilno is a fairly easy capture on a good set, using an H.F. stage, and will generally be found repeating the Warsaw programme.



THOSE of you who read these pages last month will remember that I prophesied that short-wave conditions would be likely to improve from now

Every month more and more people are getting interested in short waves, and no matter what particular section of this fascinating subject interests you, you will find something of interest in these pages. Our contributor has had many years' experience of the higher frequencies and knows his subject from beginning to end.

onwards, if there happened to be anything in the "eleven-year cycle." Since writing those notes I have had a long talk with a newly-made acquaintance of mine who is in the happy position of being a really expert meteorologist and an ultra-enthusiastic short-wave experimenter.

He assures me that the "eleven-year cycle" may be taken as read when we refer to sunspots, but that he doesn't think we need take it seriously in connection with short-wave radio.

Quite Unreliable

His theory is that it certainly is present in a broad, general way, but that it is so hopelessly cluttered up by other "cycles" that it is quite unreliable. There is another cycle, connected with the movements of certain heavenly bodies, that he thinks would account for the extra-good conditions that prevailed this last Spring.

If you were to draw the "eleven-year cycle" on graph paper, and then superimpose upon it all the other cycles whose existence is proved, you would probably find the resultant curve to be something like a straight line with a number of relatively small

"troughs" in it, corresponding to "bad" periods.

I have already mentioned the "fifteen-monthly cycle," supposed to be a ninth harmonic of the eleven-year

affair, and it seems to be a fact that periods of bad conditions do occur, roughly, every fifteen months.

The period of time for which these conditions last is entirely dependent on the relative positions of the other

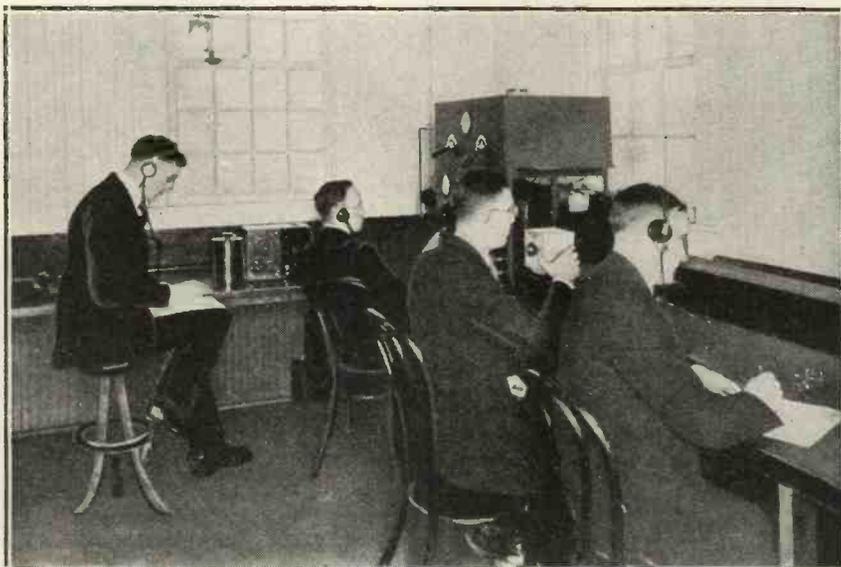
cycles, of which there appear to be at least six! I departed from this learned gentleman in a chastened mood, determined that the job of prophet was productive of more kicks than ha'pence, and that I would abandon it forthwith.

A Matter of Location

For that reason let me state, here and now, that I haven't the vaguest idea of what short-wave conditions will be like on October 1st, or at any other period from then onwards.

One point occurs to me here with reference to "location." It is

THE FIRST BROADCAST FROM K D K A



This remarkably interesting photograph was taken nearly twelve years ago, when K D K A, the very first broadcasting station in existence, commenced operations. It is located at Pittsburg, U.S.A., and to-day announces itself as "The Pioneer Broadcasting Station of the World."



an undoubted fact that the place at which one is situated has a great effect upon the parts of the world that one finds it easiest to receive. Station "A," at Tooting Bec, may receive Australia and South America extremely well, while Station "B," at Wandsworth Common, may find that he always hears North America and South Africa, with very little else.

Station "C," in the Midlands, may be good for India, Java and Japan, while the unfortunate Station "D" may be extraordinarily well placed for the reception of the Fiji Islands, Central Pacific Ocean and South Pole.

Always the Same!

Of course, the latter chap won't know how well he is placed for those areas, because there aren't any signals coming from them on which he can check up!

The point I am leading up to is this, that "A" will think conditions are bad when his Australians and South Americans don't happen to

come in well, whereas at the very same time Africa may be extra good, making "B" think that conditions are marvellous. As for poor old "D," if he really can't receive anything except the places I have suggested, conditions will always seem the same to him!

Surely this shows why it is that the reports I receive from readers vary so much. For this "location" business is definitely proved up to the hilt. One big fact that I have left out, however, is the effect of the aerial used. A man may often change his "good spots" completely round by putting up an aerial in a different direction, or even one of different proportions.

All-Round Compromise

I have done so myself times without number, and have eventually settled down to an unsymmetrical and generally inefficient-looking aerial simply because it appears to be a compromise all round. It gives me fairish reception from all parts of the world, instead of excellent reception from one continent and mediocre results from the rest.

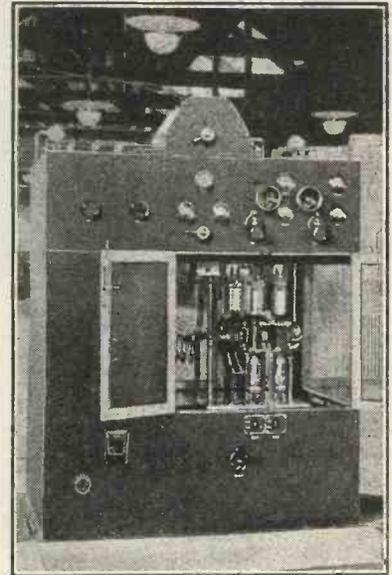
This, to me, is just one of the many things that make short-wave work so intriguing. If it were easy, I should simply be bored with it, and doubtless my readers feel the same. If you just want to hear distant stations, and are prepared to pay for the privilege, you simply

buy a commercial short-wave super-het. and twiddle the knobs.

If, on the other hand, you want to make a hobby of the business, then you build your own gear from the junk-box and proceed to find out a few of the "whys and wherefores."

Incidentally, the stepping-stones in the life of a short-wave fan appear to be the following: "Mildly interested reader of short-wave articles;

RUGBY RADIO



The final amplifying stage of the largest wireless station in the world. It is situated at Rugby, and belongs to the British Post Office.

possessor of short-wave receiver; reporter of amateur signals from all over the world; would-be amateur transmitter; and fully-fledged 'ham.'" At the recent R.S.G.B. Annual Convention I was talking to quite a dozen "hams," who told me that "On the Short Waves," or similar articles, had started them off on that path.

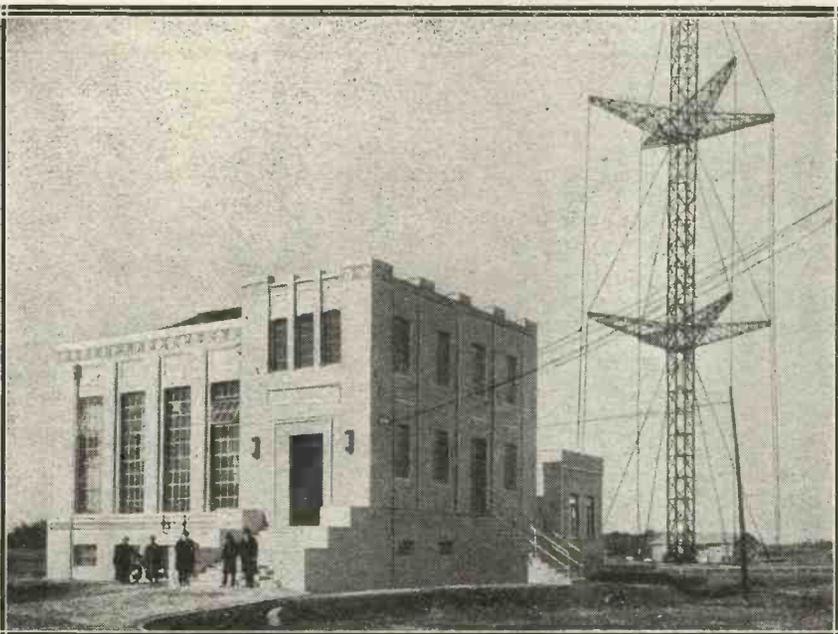
Wearing Out the Ether

And here they are, in some cases less than two years afterwards, with a roomful of transmitting equipment of which anyone might be proud, and with radio friends in most of the countries of the world.

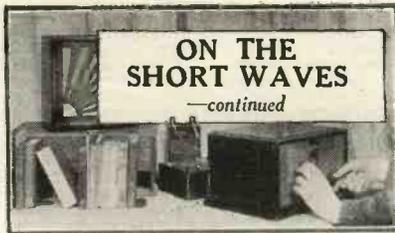
Truly, the listener of to-day provides the signals for the listener of to-morrow! "P.P.E." told the world many years ago that it was "more blessed to send than receive," but if we all did that the ether would be worn out in a year or so.

One of the most interesting features of the Convention, by the way, was the address by Capt. A. J. L. Murray, D.S.O., O.B.E., R.N., on the subject of the formation of the Royal Naval

SHANGHAI'S UP-TO-DATE SHORT-WAVER



The latest step in modernising China—the up-to-date short-wave station at Shanghai that is used for communicating with all corners of the world. It uses one of the new anti-fading aerial systems, hence the unusual type of mast.



Wireless Auxiliary Reserve (hereinafter called the R.N.W.A.R.). A scheme is well in hand whereby, in the most unlikely event of another war, the Navy will be able to call immediately on a large body of trained operators, recruited principally from among the amateur transmitters of the country.

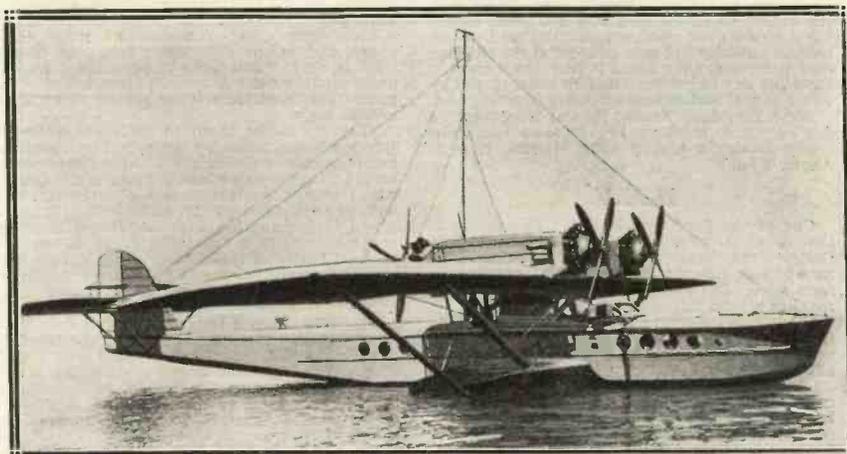
Sound Technical Knowledge

The competent "ham," naturally, is more than a man who knows the Morse code inside out; he is a man used to "getting on the air," and familiar with radioprocedure. Further, he has a certain amount of sound technical knowledge. Where could one find a more likely person to qualify for the job of wireless operator during hostilities?

The other side of the question, too, is important, for it shows that the Admiralty recognises the existence and the usefulness of the much-maligned "ham." This is really the first time the British "ham" has been officially recognised, and he ought to feel duly proud of the fact.

Naturally, the scheme has not gone down with unanimous approval. Certain dissenters put forward the perfectly sound argument that amateur radio is a vast movement for international peace, and that a proposal of this nature savours of "selling the bond of friendship to the

A RADIO-EQUIPPED SHIP-OF-THE-AIR



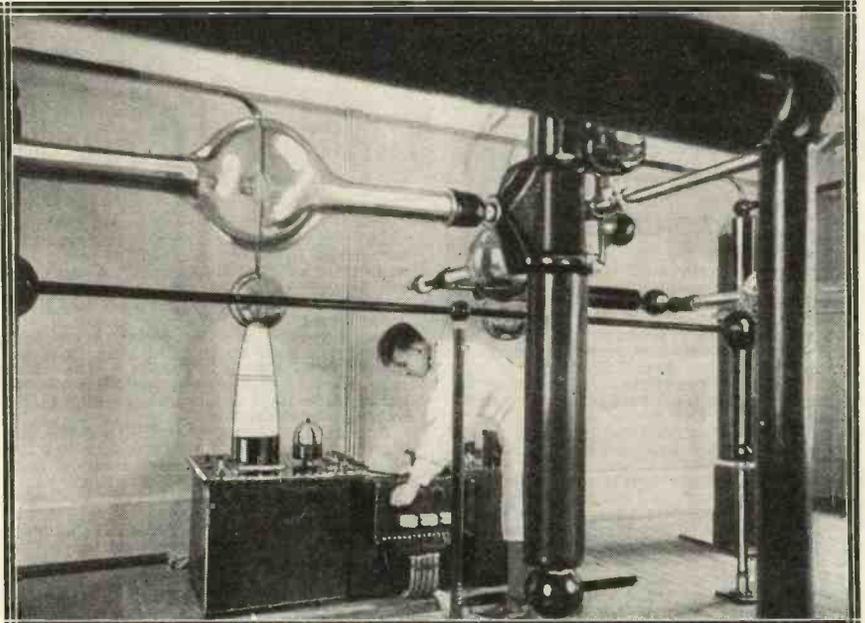
Designed for long-distance cruises, this flying-boat is equipped with a highly efficient radio installation. So that communication can be maintained when on the surface of the water, the aerial is supported on a light mast.

armed forces." So well was this argument put forward at the Convention that I am as yet unconvinced on one side or the other.

Certainly no thinking man can join a movement on account of its power for the continuance of peace, and at the same time start preparing for

my previous two years' logs for October and November. In the amateur world the outstanding effects are the arrival of signals from the Antipodes, both in the early mornings and afternoons, and the general unreliability of the "Yanks" in the evenings.

HEALING WITH THE AID OF HIGH-FREQUENCY CURRENTS



Special high-frequency apparatus installed in a German hospital for treating certain ailments. In the course of experiments pressures up to 600,000 volts have been used.

war; but, all the same, it's no good shutting one's eyes to possibilities, however unpleasant or remote, of some unfortunate breach of the peace in the distant future.

From the Antipodes

"Winter conditions" will soon be in force once more, and, without falling back on mere prophecy, perhaps I can make a few remarks on

I believe this applies, too, to the broadcast bands, with the exception of the 49-metre crowd of Americans, who usually continue to come over well all through the winter, starting rather earlier in the evenings than usual.

Eclipse News

Those who were fortunate enough to be listening to an American station on the night of the total eclipse (August 31st) were regaled with a full running commentary in highly dramatic style on the progress of the moon's shadow over the earth.

I heard it from W 2 X A D, W 3 X A L on 16.8 metres, and W 8 X K down on 13 metres, at practically equal strength from all three.

Although readers' letters seem to indicate that most of them noticed a falling-off of signals during the few seconds of totality, I found exactly the reverse myself; W 2 X A D in particular coming up to a roaring strength for a few moments, although he was badly affected by fading between 9 and 9.30 p.m.

I hope to have some complete data for publication next month.



RECENT RECORD RELEASES

BROADCAST

GOOD novelty records are not easy to find nowadays, for most of the brilliant ideas have been snapped up. One that should have special mention, however, is the ten-inch Broadcast record, Famous Choir of Canaries, which is a wonderful disc in its way.

How many canaries there are in the performance we do not know, but the trilling of the birds to the orchestral accompaniment in *O Sole Mio* and *Monastery Garden* is exceedingly fine. You should make a point of hearing this disc. (888.)

A *Day's Music in Our Street* is another novelty record that has "personality," if we may so call it. It is obviously from its title a miscellany of pavement artistes, and as such it is remarkably lifelike.

The barrel organ is very well portrayed, and the recording of these discs since the new method has been adopted is very much improved. You will like the Jews' harp accompaniment to the mouth organ. (889.)

A Spot of Sport and Oh, Whiskers (886), by Billy Danvers, is good fun of the music-hall type, with broad humour; while of the dance discs, *I've Gone and Lost My Little Yo-Yo* and *The Gag Song* are sure to begood sellers. (894.)

They are of the very broad type, the latter being based on the galaxy of "She was only a Book-maker's Daughter" type of joke that has been going the rounds during the last few months.

Of the larger Broadcasts there are several really excellent recordings. *The People Upstairs* and *The Big Drum Major* (3225), by the Western Brothers, are well worth hearing. The recording is good and the entertainment value is good also, especially in the last-named, which has some interesting instrumental effects.

A *Posy of Popular Tunes* (3230), played on the piano by Peggy Cochrane, is an excellent record. The tone of the piano is very well portrayed, and the items chosen are really popular. You should hear it, it is worth much more than is asked for it.

The *Miserere*, from "Il Trovatore," and *Barcarolle* ("Tales of Hoffman"), sung by Thea Philips and Francesco Vada (3230), are good, though the recording of the voices is a little harsh at times.

Some more dance numbers worth hearing are *Downhearted* (3237), *Troubles Are Like Bubbles* (3238), by the Harvard Dance Club Aces, and *Julian* (3239), by Stein's Tango Orchestra Tipica.

COLUMBIA

There are two twelve-inch Columbia records that we want to bring to your notice this month—not that they are the only two listed, but they are of particular interest in that they are very fine recordings and the first mentioned is something of a novelty.

Here, then, are the titles: *Hill-Billy Songs* (DX365), sung by Carson Robison and his Pioneers, and the other is a recording of the famous second Hungarian Rhapsody, by Liszt, played on the piano by Ignaz Friedman. (DX350.)

As a recording, the "Hill-Billy" record is a wonderful piece of work, the voices, the banjo and the mouth organ are all clear-cut, and the full timbre is obtained throughout. The numbers included are, of course, a mixture of the well-known nigger minstrel songs, such as "Casey Jones," and Southern songs of deeper sentimentality.

The "Hungarian Rhapsody" is a full-blooded recording, and except for one or two instances the trouble of that peculiar timbre that is the characteristic of many piano recordings is absent. The reproduction is excellent, and with a good electric reproducer very life-like.

The first of the ten-inch discs that we are going to discuss is *Musical Influenza* (DB882), a disc with an intriguing title by the "Atishoo" Opera Company. The "contents" are parodies of well-known operatic and ballad melodies, based on the

"hero's" bad attack of the well-known complaint.

The visit of the vicar is a good touch, while the second side is better even than the first. It is well termed a "Tuneful Epidemic." A very different ending from that expected is arranged. You should hear it. By the way, is it Leonard Henry as the poor patient?

Albert Sandler and his Orchestra are truly delightful in their rendering of *Gipsy Moon* and *Bird Songs* at Eventide. (DB853.) The former number is being well plugged by the dance bands, but it reaches its finest interpretation when played by a light orchestra.

Onaway, Awake, Beloved (Cohen) and *The Lute Player*, sung by Harold Williams, is a very fine record indeed (DB857), and one that should be in every gramophone's library.

Lighter fare is provided by Flotsam and Jetsam on DB883, where they sing *Big Ben Calling* and *The Ghost of An Old King's Jester*. The former is rather weak in its conception, and the lack of tune is emphasised by the "effect" of Big Ben striking. The second number is more up to the usual F. and J. standard.

I'm Carefree and *My Mum* are two of the Savoy Hotel Orpheans' dance numbers this month, the former being excellent, though we do not much care for the latter. (CB468.) *Let That Be a Lesson to You* and *I Don't Blame You*, with vocal chorus by Chick Endor (CB479), are good items; and the vocal choruses, as one would expect, leave nothing to be desired.

A brief selection from some of the records released during the month. Only a few are discussed, but they are representative of the many brought out by the various gramophone record companies.

The B.B.C. Dance Orchestra has recorded Flannagan and Allen's famous song, *Underneath the Arches*, on CB481, and with the vocal chorus have made a good number of it. But we fear this haunting melody will soon be killed if the plugging does not cease. We heard it four times running the other day in less than half an hour, played by either dance band or light orchestra over the radio.

Wrap Your Arms Around Me and *Wherever You Are* are good numbers by the same band, the former having a snappy vocal chorus by, is it, Anona Winn?

H.M.V.

One of the chief records issued this month is that by the London Symphony Orchestra of Eric Coates' *From Meadow to Mayfair*. This takes the form of two discs (C2448-9), and is a fine recording from a technical point of view, and it necessarily requires a good instrument to reproduce it.

On an inferior gramophone the result is nothing short of painful, for the timbre of the strings is essential to the interpretation of the piece, especially in the second section, "A Song by the Way." As a matter of fact, we would like to have heard more of the violins, for the whole piece tends to become too much on one level of tone, and the result is rather monotonous.

Going from the sublime to—something lighter, we come to Gracie Fields in *Waiting Time* in Old Vienna and *A Fly's Day Out*. The former is the better of the two, and is more like the popular Gracie in style. "A Fly's Day Out" is rather pointless in its words.

In the Viennese number, Gracie's imitation of the Army sergeant is a typical touch. (B4214.)

Mischa Elman is always welcome, and his *Le Cygne* and *Melodie* (DA1143) are excellent examples of good violin recording, coupled with choice of item that is eminently suitable for home entertainment. The bite of the bow on the strings is captured in fine fashion, and the record is worth hearing for that alone, apart from the musical value it also contains.

Paderewski has chosen two "gems" to record on DA1245, though to the average man they are not likely to appeal greatly. The first, *Mazurka in D Major* (Chopin), is very monotonous, and though the recording is good we cannot recommend the record as a piece of entertainment any more than we could advise you to get Czerny's Exercises and sit and listen to them, even if played by the greatest pianist in the world.

The second item, *Mazurka in A Flat Major* (Chopin), is like unto the first in its conception, though it is a little more tuneful. Technically, the records are perfect.

Switching over to low-brow we have Frances Day and Max Kirby singing two excerpts from "Out of the Bottle," *Everything But You* and *I Don't Want You To*. They are typical snappy musical comedy numbers that are well sung and well recorded. The orchestral accompaniment is delightful. (B4223.)

It takes a really good radio-gramophone to reproduce anything approaching the harsh blare of the trumpet, but without this many of the latest hot numbers are completely spoiled, so we would not advise you to get the following unless you are confident that you will be able to reproduce them in such a manner as to do them justice. If you can, then get them by all means if you are fond of hot orchestras.

The first is *At the Prom* and *The Way I Feel To-day*, by Irving Mills and his Modernists and McKinney's Cotton Pickers respectively. They are both very fine pieces of work, and are worth hearing (B6204). The vocal chorus is most artistic.

Here are some more "red-hot toons" that will be enjoyed by thousands of dance-band enthusiasts. By George Olsen and his Music we have *Downhearted* (fairly straight) and *Fools in Love*, this by Lew Conrad and his Musketees. (B6214.) *There I Go Dreaming Again* (with female vocal refrain, and a rather haunting theme) and *You Can Make My Life a Bed of Roses*. (B6202.) This latter is another fine number with a most artistic vocal refrain.

McKinney's Cotton Pickers also give us *Miss Hannah* and, on the reverse side, *I'm a Ding-Dong Daddy* is played by Johnny Johnson and his Orchestra. (B6215.)

Ambrose and his Orchestra are to be heard in *Humming to Myself* and *Soft Lights and Sweet Music*, two tuneful numbers that should not be missed. Ambrose is not an exponent of "hot" playing, hence his general popularity; and a well-deserved popularity it is, for his is undoubtedly one of the finest dance orchestras in the country. (B6205.)

ZONOPHONE

Another novelty record of note has been found by the Zonophone Company. We refer to the cookery record, *How to Make An Omelette*, by X. M. Boulestin. It is divided into two parts, *Theory and Practice*, and it will undoubtedly have a great appeal among the housewives of Great Britain. The omelette has always been a weak point in our cookery armour; here is a chance to strengthen it (not the omelette). Hear record No. 6174.

Lullaby of the Leaves, sung by Sam Browne, is worthy of note, as it is well sung and not overdone, as is so often the case with this type of number. (6154.) On the other side is *When Work is Through*.

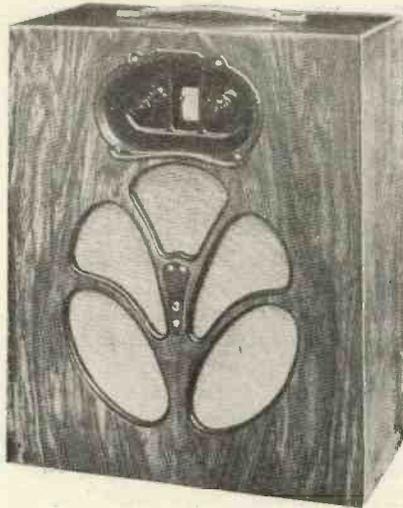
Some new dance combinations make their appearance in the Zonophone lists, and one of these is a real "find." We suspect that it records under another name as well, but that is beside the point. The Zono. name of the band is Terry Mack and his Boys.

They are to be heard to great advantage in *Bahama Mama*, which is a triumph of orchestration and ingenuity in the handling of the instrumental breaks. On the other side is *Cabin in the Cotton*, which is very good, though not such an outstanding number as that just mentioned. (6180.)

Syd Lipton and his Grosvenor House Band are worth hearing in *A Great Big Bunch of You* and *Marta*. The band is neat and compact, but there is nothing really outstanding in their performance. (6181.) Why do so many bands make their numbers so flat?

The Blue Lyres (Ambrose's second band) are always good. This time they are to be heard in *The Clouds Will Soon Roll By* and *The "O" Song*. This latter is a snappy number that is well played by the band, and is sure to be popular. We suppose that Flannagan and Allen are responsible for the idea, but wherever it comes from it is good. The comedy is original and the theme is fresh—a relief in these days of threadbare sentiment and sugar singing. (6162.)

I Want to Cling to Ivy and *The Flies Crawled Up the Window* form two more of the Blue Lyres' numbers. They are recorded on 6153, and are both good in their way.



All controls are conveniently situated.

Nowadays the word "portable" has come to mean something more substantial than the artificial leather suitcase contraption that housed three or four valves in an inefficient circuit such as we used to know a few years ago.

To-day it conjures to one's mind a well-designed and powerful set housed in an attractive wooden cabinet, and though it may not be light enough to carry when hiking, it is really portable in that it requires no aerial or earth connections, and is at the same time a serviceable household set, not one merely meant for outdoor picnic work.

TECHNICAL SPECIFICATION

CIRCUIT DETAILS :—Six valves, S.G. ; Oscillator ; S.G. 1st detector ; S.G. L.F. amplifier ; 2nd detector ; Pentode.
CONTROL ARRANGEMENTS :—Four controls. Two for tuning ; one for volume control ; one for wave-changing and "on-off" switching.
SPECIAL FEATURES :—Local/long-range control ; balanced-armature speaker ; provision for pick-up ; especially low consumption.
BATTERIES :—L.T. 2-volt 28-amp.-hour accumulator (consumption 0.6 amp.). H.T. 120-volt super-capacity dry battery (consumption 10 milliamps).
MEASUREMENTS :—Height 18 ins., width 15 ins., depth 8 ins., weight 32 lb.
PRICE :—17 guineas, including valves and royalty.

So, on hearing that a new portable—the first from Hayes—was being introduced on the market, I obtained a promise from the firm concerned that they would give me the opportunity of testing an early model. And so, not long ago, the H.M.V. super-het. portable arrived at Tallis House, and was handed over to my tender care.

Attractive Appearance

In appearance it is one of the most attractive portables I have seen. Its cabinet-work is carried out in

THE H.M.V. SUPER-HET. PORTABLE SIX

The main technical details and test report of the first H.M.V. battery receiver.

By K. D. ROGERS.

true H.M.V. style and, as would be expected, is above reproach. It is of walnut, and the simple design makes the set both attractive and business-like in appearance.

All the controls are grouped conveniently on a neat escutcheon plate above the loudspeaker fret, and a most ingenious method of minimising the number of knobs has been devised. The turntable, too, is a neat and invaluable incorporation.

Straightforward Controls

There are four controls, and these are operated by means of a concentric system of knobs. Thus we have two small switch-like knobs protruding slightly from two rings. The knobs control in the one case the fine tuning of the set, and the surrounding ring the dial setting, while in the other case the knob controls the wave range and switches the set on or off, and its accompanying ring is a volume control.

The circuit of the set is a six-valve super-het. arrangement, with an input S.G. valve, followed by the oscillator, first detector (which is a screen-grid valve), then an intermediate stage, second detector, and output pentode.

And the marvel of it all is that the total high-tension current consumption of the set is a bare 10-11 milliamps. when working at the specified voltage of 108. The receiver is automatically biased, and a battery of 124 volts is provided so that the H.T. can be increased as the cells run down.

Standard Valves

Two-volt valves are used throughout, and volume control is carried out by varying the bias of the first screened-grid valve. A long-distance or local switch on the back of the cabinet allows a very useful sensitivity adjustment that ensures good quality when listening to the local or very strong stations.

The loudspeaker is of the balanced-armature type, and provision is made at the back of the set for a pick-up, alternative loudspeaker, and external aerial and earth for the man who is

not content with a really good bag of stations, but wants them all.

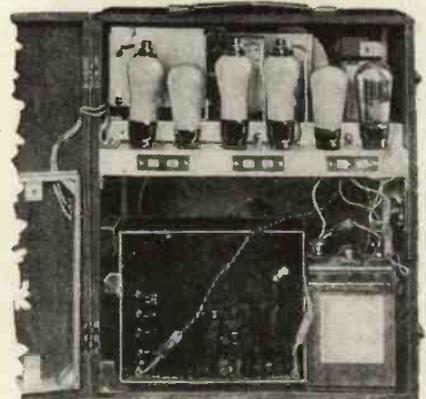
The circuit diagram will tell the more technically minded of my readers most of the things they want to know about the H.M.V. super-het. portable, and it remains for me to go into the actual test and the way the set behaved itself.

Naturally, London is no fair place in which to test a super ; or I should say, perhaps, that Tallis House is no fair place. So, as is done with all receivers where a range test is required as well as a mere sensitivity meter test, the portable was taken out into the country to give it a real chance.

Splendid Range

It took it. There is no mistake about this set's capabilities, for once given the air it ranged round Europe in a manner that was astonishing. One is not accustomed to regard the portable as a distance-getter, and the use of the super-heterodyne principle (ideal for the purpose) in the H.M.V. portable rather upsets one's subconscious calculations.

AN INGENIOUS LAYOUT



The internal design is well worked out from every point of view. The cabinet measures 18 by 15 by 8 ins.

But after a few minutes the surprise wore off, and I settled down to enjoy a good evening's hunting. All the old favourites among good outdoor aerial receivers came in without coaxing,

THE H.M.V. SUPER-HET. PORTABLE SIX
 —continued from previous page

and the tone of the loudspeaker is excellent for so small a set.

The long waves are as good as the medium, and as a programme-getter the H.M.V. portable is certainly in a class by itself. The ease of control will be an eye-opener to anyone who has not handled a good super, and the absence of background noise (other than that of electrical interference when going all-out on the distant switch setting in a crowded town) is very commendable.

Easily Accessible

The whole of the chassis pulls out from the back for servicing if necessary, the removal of the es-cutchcon front freeing the inside of the set. Even the "most perfect" of sets will need a little attention from the service department, and it is not necessarily any reflection on the set that this is so, and the arrangements for easy and efficient servicing are part and parcel of the design of all properly built receivers.

Luckily a good set does not often require much attention in this direction, but such jobs as renewing a valve (which also is only an occasional requirement), can be done in a few minutes by just removing the back of the cabinet.

Quality First

The price of the H.M.V. super-het. portable is 17 guineas, and it is a price that should appeal to a widespread public. The set is good—I have not the least hesitation in saying so—and the price is exceedingly reasonable.

H.M.V. have for long been the hall-mark of the gramophone industry, and when the radio-gramophone came into being they determined to retain their position in the land. Now they have entered a new field, but if

this, their first battery receiver, is a true forerunner of later designs, we shall hear a great deal about H.M.V. in this respect in the future.

REGARDING "SLOPE"
 Some interesting facts about high-efficiency valves.
 By HANDEL REES.

WE hear much about "steep slope" power valves, but this is not always a desirable quality unless you know how to make correct use of it.

Another name for slope is "mutual conductance," usually stated as so many "milliamps per volt" (or mA/V). It indicates the change in anode current per volt change of grid potential, and this is represented by the "steepness" of the characteristic curve. For example, if the slope of a

"amplification factor." The latter refers to the *voltage* amplification alone without regard to current; it states the number of times the grid voltage variations are magnified, whereas mutual conductance gives the corresponding change in *current*.

It's Power That Counts

But "power" is not volts or current. It is the *product* of the two, so that a valve having both a high amplification factor and mutual conductance is capable of delivering a large power output to a circuit of suitable impedance.

The current, however, varies *inversely* with respect to another quantity—viz., the "impedance" of the valve. For a given amplification factor, the less the impedance the greater the change in anode current corresponding to 1 volt change in grid potential. To get a large slope, therefore, we must either increase the amplification factor while keeping the impedance constant, or decrease the impedance for a given amplification factor.

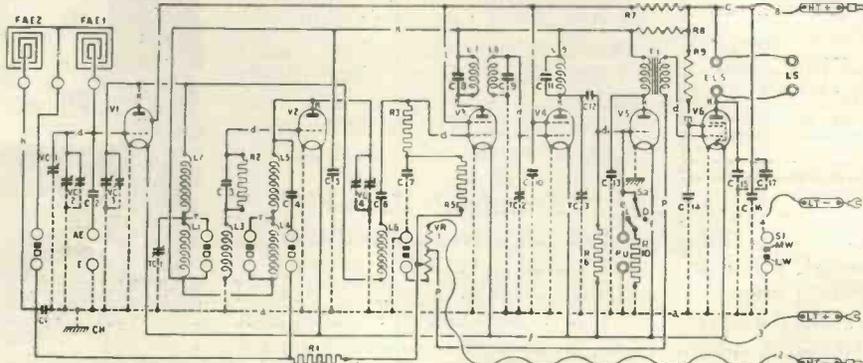
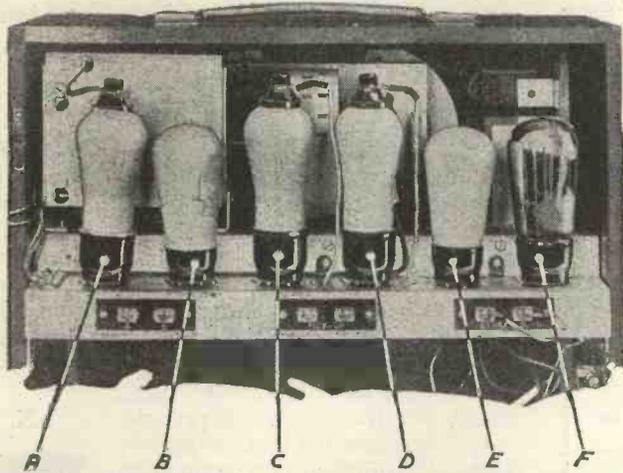
Large Mag.

In effect, that means that the valve will provide a large voltage amplification combined with large change in current for quite low variations in grid potential. That is, it will deliver the full power output of which it is capable at comparatively small grid impulses, and in that sense it is an excellent power valve of large amplification.

But the grid impulses must be *small*, otherwise overloading inevitably occurs. For this reason, steep-slope valves are not adapted for heavy inputs, as in the last stage of a receiver employing two previous transformer-coupled stages. Thus an ordinary power valve is frequently over-

loaded in this position, to say nothing of one having twice the amplification factor. This is a case where push-pull can be used to advantage, as this arrangement will handle double the grid-swing of a single valve.

HOW THE CIRCUIT IS ARRANGED



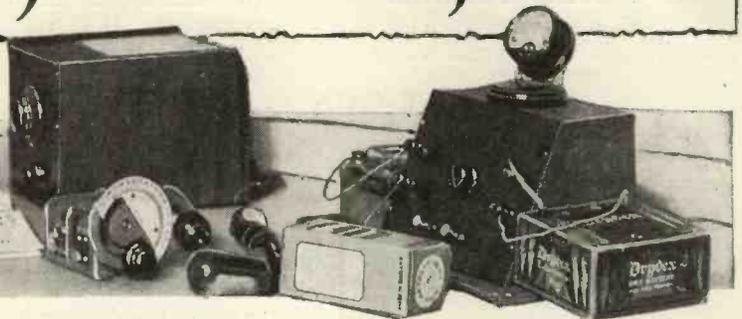
The circuit of the H.M.V. Portable Six contains a pre-mixer H.F. valve (A), then the oscillator (B), then the mixer (C), intermediate S.G. (D), second detector (E), and a steep-slope small-consumption pentode output (F).

particular power valve were "3.8 milliamps per volt" the plate current will vary by 3.8 milliamps for every volt change in grid potential.

Mutual conductance must, however, be carefully distinguished from

A RADIO RECKONER

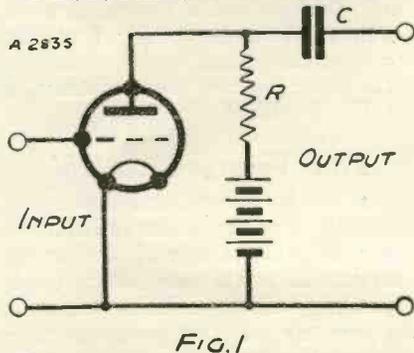
By W.A. Barclay M.A.



To obtain maximum amplification from a valve certain conditions must be fulfilled, and in this article our contributor discusses the subject in really easy-to-understand terms. In addition, he gives two useful N-diagrams that will save many complicated calculations.

IN recent sections of this series we have been studying the ordinary three-electrode or "triode" valve, and trying to obtain some sidelights on its use in amplifying circuits. As every constructor knows, the form in which an incoming "signal" comes to the amplifying valve is that of a varying

RESISTANCE COUPLING



With this form of coupling, varying voltages are set up across the anode resistance, and they are then fed to the next valve through the condenser C.

voltage, which, as we say, is "impressed" between the grid of the valve and the cathode or filament.

Varying Pressure

In other words, there is a difference in electrical pressure between the grid and the filament which is continuously varying in accordance with the strength and character of

the input. This varying pressure difference has its effect on the electron stream flowing from filament to anode, resulting in a corresponding variation in the current flow through the valve.

To achieve a strictly "voltage" amplification, however, we must utilise this variable current to provide us with the magnified voltage variations which we desire. For this purpose we may invoke our old friend, Ohm's Law.

Voltage and Current

It is well known to readers that if a direct current of I amperes be made to pass through a resistance of R ohms, the potential difference between the two ends of the resistance will be given by the product $I \times R$ volts. It follows from this that if the anode current be a variable one, the corresponding voltage across the ends of the fixed resistance will also be variable in sympathy with the current. Moreover, the magnitude of the resulting variable voltage will always be given by R times the corresponding current variation in amps.

By inserting such a resistance R in the anode circuit of the amplifying valve, as in Fig. 1, a voltage variation is obtained which is usually much greater than the voltage signal originally impressed on the grid. We can, therefore, speak of the ratio

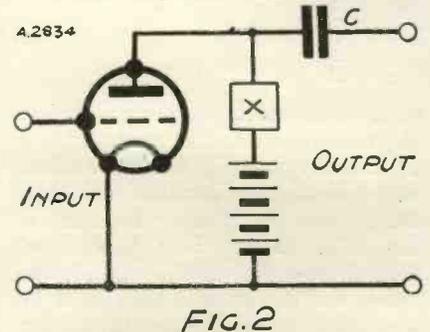
between these two voltages as the amount of the actual amplification obtained.

Due to the Valve

This method of amplification, called the "resistance-capacity" method, was dealt with in the last instalment. It was shown that part of this amplification is due to the valve itself, while the value of the resistance R also has a share in the process.

Obviously, the larger R is made, the bigger will be its voltage producing effect for a given current, since $E=I \times R$. At first sight, therefore, it seems that as large a value of R as possible should be employed; but, unfortunately, there is a complication which we have omitted to take into account.

THE CHOKE METHOD



Choke coupling works in a way similar to the resistance arrangement, but it has the advantage that more of the H.T. is available for the anode of the valve.

Your Output Stage Efficiency at a Glance

It will be remembered that in order to allow the signal variations to operate, the valve must be supplied with the correct working values of mean or steady voltage on both anode and grid. When this is the case, the correct amount of mean anode current will flow.

At a Lower Potential

Now this steady current must also pass through the external resistance

value of mean anode current is 2 milliamps. We shall suppose, further, that we have an anode resistance R of 50,000 ohms and an H.T. battery of 120 volts.

Then, if we could pass 2 m.a. steady current through 50,000 ohms, the resulting P.D. would be $\frac{2 \times 50,000}{1,000}$, or 100 volts across the latter. But since the total H.T. voltage is 120, this would only leave the anode at

not pay to increase the value of the anode resistance beyond a certain amount, since by doing so we should cause the mean voltage on the anode to fall below the level prescribed by the makers for correct working. Indeed, there is always the disadvantage with this type of amplification that the full voltage of the H.T. supply can never be used on the anode, since, as we have seen, the considerable voltage drop in the anode resistance must always be subtracted from it.

STAGE-GAIN STATISTICS

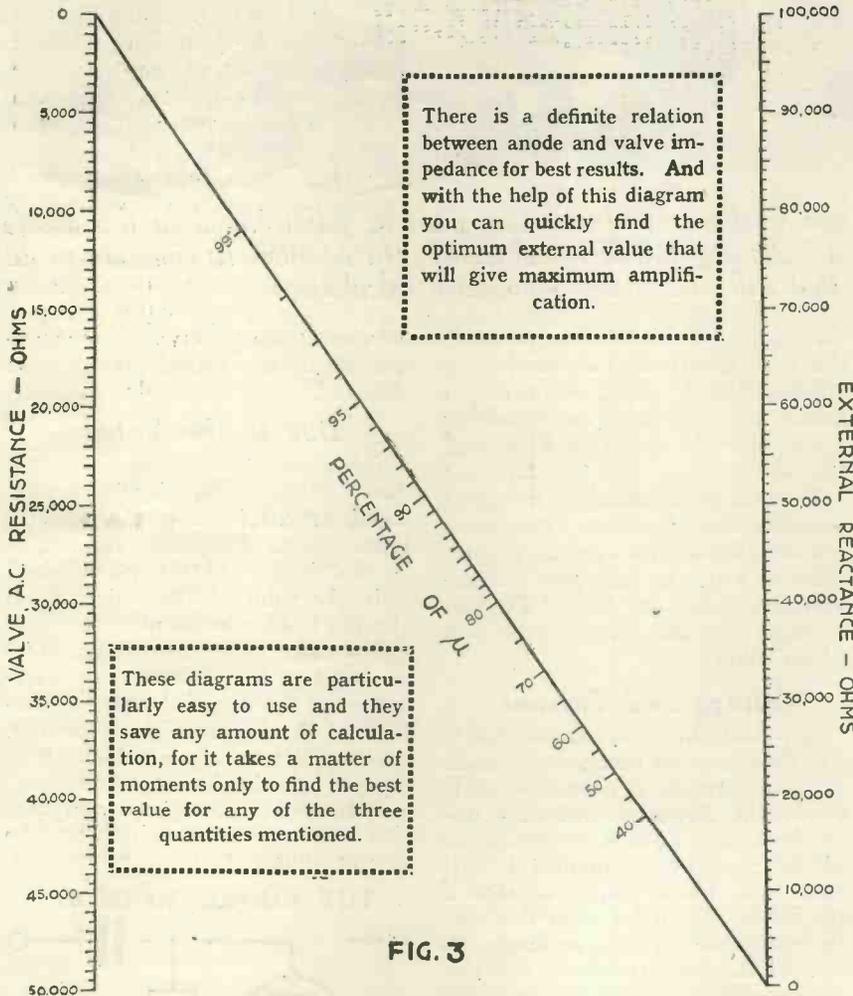


FIG. 3

of R ohms which has been placed in the anode circuit, and naturally sets up a steady potential difference across it. A little consideration will show that, since the positive terminal of the H.T. battery is the point of highest potential in the circuit, the anode end of the resistance must be at a lower potential than the battery end.

Suppose, for example, we wish to use a valve for which the correct

20 volts positive; obviously quite insufficient to produce the normal working current.

It Will Not Pay

Under these circumstances, naturally, the valve would not work efficiently. Either the H.T. supply would have to be increased or the resistance value must be reduced.

It is clear, therefore, that in a resistance-coupled amplifier it will

An Alternative Method

Naturally, therefore, one looks about for an alternative method of amplification which will not be subject to the above disadvantages. Our problem is to find some sort of load for use in the anode circuit which will permit the variable signal current to develop the required voltage oscillations. At the same time it must present no obstacle (and hence no voltage drop) to the steady or D.C. component of the current, thus enabling the full battery voltage to be utilised at the anode. Fortunately, it is not difficult to find such a load.

In former sections of the Radio Reckoner we studied the nature of alternating currents, and found that these obeyed a special form of Ohm's law in which "reactance" is substituted for resistance. Suppose, now, that instead of the resistance R in the anode circuit of Fig. 1 we were to substitute a load having a reactance of X ohms, but very little resistance, as in Fig. 2. What then?

Full Voltage Available

It will be remembered that reactance offers no opposition to D.C., but only to A.C. The variable current through X would then set up corresponding voltage variations across it in precisely the same manner as with R , but this time there would be no D.C. voltage loss. The full voltage of the battery would thus be available at the anode, with consequent highly increased efficiency in the functioning of the valve.

Readers will recall that "reactance" is the name given to the fictitious kind of resistance offered by inductance and capacity to alternating currents of different frequencies. The simplest way to provide the desired reactance X in Fig. 2 would be to use an inductance or

How to Make Full Use of Your Valves

choke, the size of which would depend upon the range of frequencies to be amplified.

In the issue of MODERN WIRELESS for September, 1931, an N-diagram was given from which the reactance of such an inductance could be read off at any audio frequency, while in the subsequent issues of October and November similar diagrams appeared dealing with the higher frequencies used in radio work. From these

the value of X in the external anode circuit, we might proceed as last month to find the percentage of μ actually obtained.

Unfortunately, however, the matter is not so simple, and we cannot merely substitute the value of X for R in the formula and N-diagrams of last month. The formula for choke-coupling (as this type of amplification is called) is a little more complicated, being:

described last month, the sole difference being that values of anode reactance, X, are shown on the right-hand upright, instead of the resistance, R. For a given inductance and frequency, therefore, we must first of all ascertain the corresponding reactance by means of the charts given last autumn, to which reference has been made.

Actual Amplification

For an example, let us suppose we are using for audio-frequency amplification a valve for which R_0 is 23,500 ohms and μ is 20. Let it be desired to find the magnification which would be obtained at 1,000 cycles if a 6-henry choke were used in the anode circuit in the position shown at X in Fig. 2.

By referring to the first chart in the September issue, the reactance of 6 henrys at 1,000 cycles is seen to be 38,000 ohms. All we have to do, therefore, is to join the points for $R_0=23,500$ and $X=38,000$ on Fig. 3, reading the percentage of amplification on the diagonal scale as 85. Hence the actual amplification obtained is 85 per cent of μ , or 85 per cent of 20, which is 17.

MARKING A PANEL
A frequently practised method that you should avoid.

MANY home constructors when they are marking out a panel for a new set use a pencil for the purpose. Now although this is a very convenient method, it is not really advisable if the best results are desired from the receiver.

Blacklead is a fairly good conductor, so it will readily be seen that if a pencil line is drawn between two points on the panel which will eventually have a difference of potential between them, it is quite likely that there will be considerable leakage of current. Besides wasting valuable juice, this state of affairs is often the cause of mysterious crackling noises in the loudspeaker.

The correct method of marking out an ebonite panel is to use a scriber. And, instead of scratching one long continuous line on the back of the panel, it is much better to break it up into several short lines. The object of this being to prevent leakage through dirt, etc., getting in the "rut."

F. B.

OPTIMUM ANODE IMPEDANCE

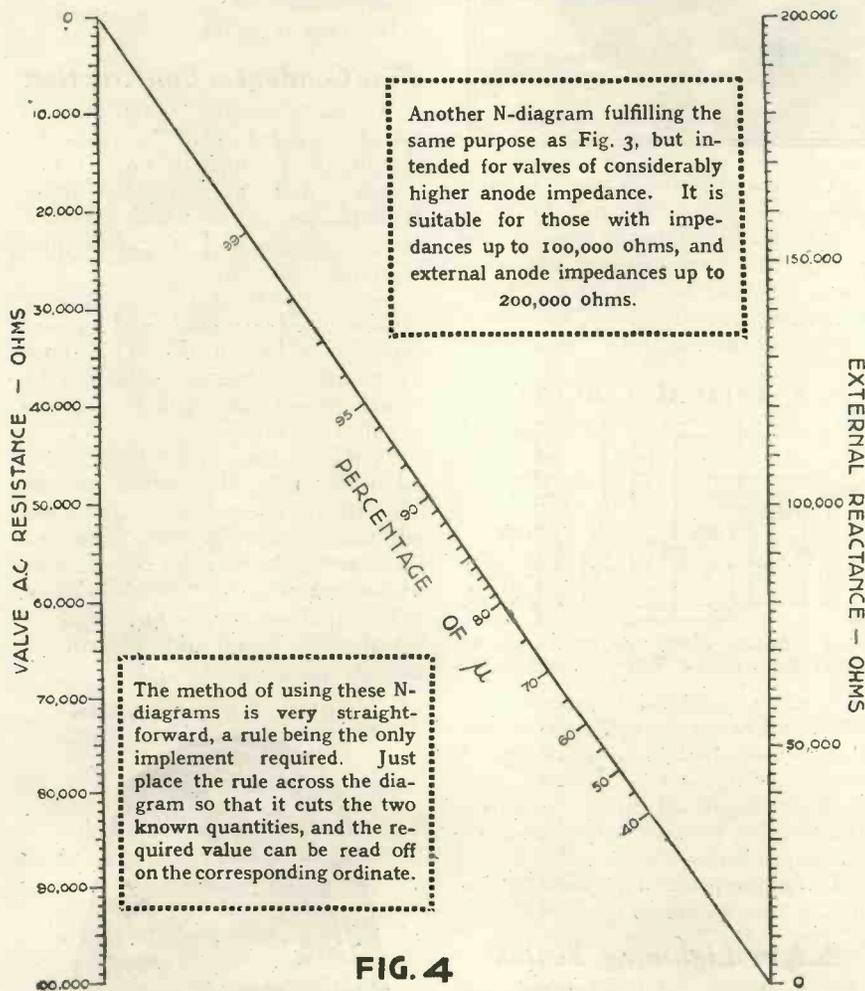


FIG. 4

charts it is an easy matter to estimate the value of X in Fig. 2 for any value of inductance when the signal frequency is known.

Practical Percentage

Having thus arranged a satisfactory anode load, we next desire to know what percentage of the magnification factor μ of the valve will actually be realised in practice. It might be thought that when the valve constants R_0 and μ are known, and also

Actual magnification = $\frac{X\mu}{\sqrt{R_0^2 + X^2}}$
 or, if p be the percentage of the magnification factor actually realised, we can write

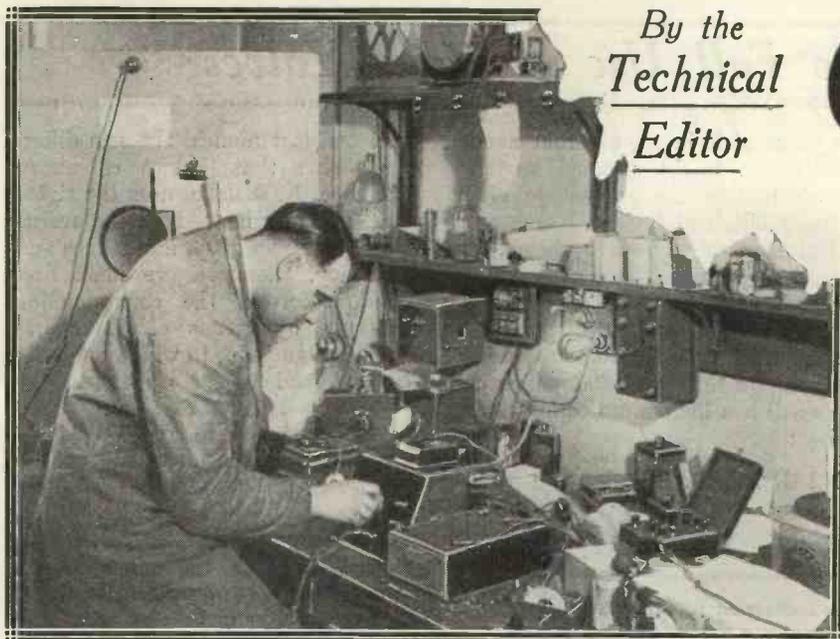
$$P = \frac{100X}{\sqrt{R_0^2 + X^2}}$$

These formulæ need not trouble us, however, as they are exemplified in the two N-diagrams which accompany this article.

The method of using these is as

By the
Technical
Editor

On the



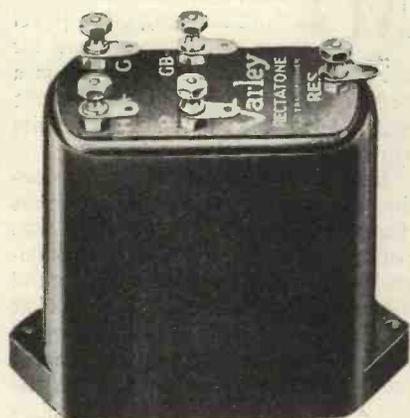
The Varley "Rectatone"

THIS is an L.F. transformer for providing high-note compensation where such is desired. But its special qualities are optional; it can be used as a high-class L.F. transformer for straight-line amplification.

As a compensater it needs the addition of a variable resistance, and with this any degree of high-frequency "lift" up to a valuably high maximum can be arranged.

The amplification is substantially straight up to 1,000 cycles, and above that the rise is sharp.

WIDE CONTROL

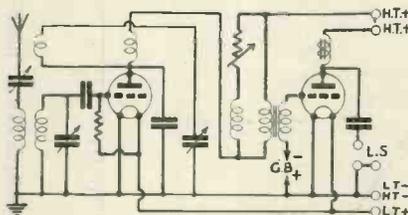


This new Varley component enables a wide control of high-note compensation to be obtained.

There are few normal sets which would fail to benefit from a high-note emphasis of this nature, and in selective sets such as super-heterodynes, and those requiring considerable reaction, some form of audio-adjustment is a matter of prime importance.

The Varley "Rectatone" is built into a compact, well-finished case on which, in addition to the terminals for normal transformer connections, is the extra terminal for the external tone-controlling resistance. The other "end" of this has to be joined to the

A TYPICAL CIRCUIT



This diagram shows the simple circuit connections of the Varley "Rectatone."

H.T. plus terminal on the transformer. The result of our tests with the Varley "Rectatone" reflect most favourably on the component. We were particularly impressed by its practical contribution towards output linearity in a super-het. set.

It should prove a popular article during this season.

Bulgin Lightning Switch

One of the most comprehensive lightning safety devices we have encountered is the Bulgin Lightning Switch. This includes a sprung-type switch with which a "midway" position is impossible, a fuse and an arrester.

There are protected apertures through which the fuse and the arrester can be viewed. Two further "windows" are provided for switch indication. The word "on" or "off" appears in these in accordance with the position of the switch.

Messrs. Bulgin provide a £100 free insurance against damage from lightning with their device, and in view of its trio of safeguards we cannot imagine they will ever have to meet any claims!

The Bulgin Lightning Switch is robustly constructed, and should be able to stand up to the vicissitudes of our varying weather and atmospheric conditions.

It retails at 2s. 6d.

Fine Condenser Construction

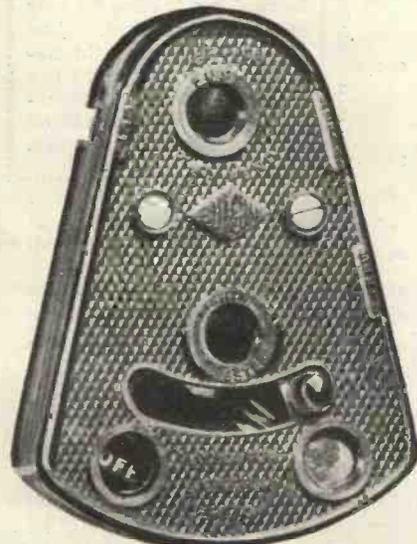
We have recently examined and tested a ganged condenser made by the British Radiophone Co. It is a "twin" and, as with the other Radiophones, is guaranteed against a maximum error of $\frac{1}{2}$ micro-mfd. plus or minus $\frac{1}{2}$ per cent.

Each section has a minimum capacity of .000026 mfd., and its total capacity variation is .0005 mfd. Therefore, the tuning range will be rather greater than with the normal so-called ".0005."

Further, there will be greater selectivity over the bottom of the dial, though some slight inductance adjustment may in some cases be necessary in order that the shorter wavelengths can be accommodated.

The trimmers provide for a capacity variation of .00006 mfd., and this is usefully generous.

THREE SAFEGUARDS



The Bulgin Lightning Switch embodies a fuse and an arrester as well as the actual switch itself.

Test Bench

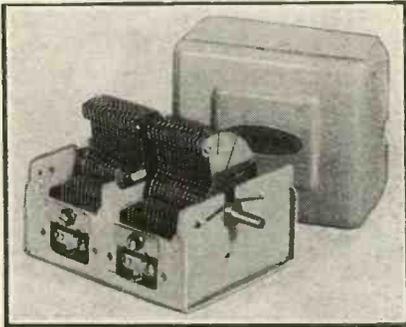
Varley, Bulgin, Radiophone, Lewcos, and Camco products form the subjects of impartial reviews this month.

An approximate log. law is followed in the vane shaping, so that a tuning curve between "straight-line" wavelength and "straight-line frequency" is given with the object of permitting calibration in either metres or kilocycles without cramping.

The vanes are of aluminium, but the frame is built of sheet steel rendered rustproof. Patent bearings ensure an unvarying smoothness of action. There is also a patent method of fixing the vanes on their spindles revealed in the Radiophone condensers which is claimed to "overcome the disadvantages of soldered joints and is far more rigid than the usual methods."

The Radiophone is certainly a fine piece of condenser engineering, and

A RADIOPHONE CONDENSER



Accuracy of ganging and liberal trimmers are features of this Radiophone condenser which "M.W." readers will appreciate.

illustrates forcibly the advances which have been made in this branch of the industry during the past few years.

The Lewcos Potentiometer

The constructor invariably likes to know what goes on inside his set and its components, and is irritated if he is expected to rotate knobs and unquestioningly take what is given him.

And so we consider it is good psychology on the part of the London Electric Wire Co. and Smiths, Ltd., to provide their Lewcos potentiometer with a transparent cover.

It is a wire-wound potentiometer, and its resistance is evenly graduated so that it can be seen at a glance how and when the moving contact is placed, and thus enables an excellent

check on the effect of the action of the component on the receiver with which it is used.

Additionally, this transparent cover enables the ingenious tilting plate movement to be seen. There is a circular disc carried on a bent spindle so that it tilts round the resistance track as the knob is turned.

The contact is firm and effective and the movement smooth and entirely free from anything in the nature of an irregularity at any point.

Indeed, we consider that both mechanically and electrically the Lewcos potentiometer is one of the very best obtainable, and its comparative inexpensiveness must be credited to it as a further very attractive feature.

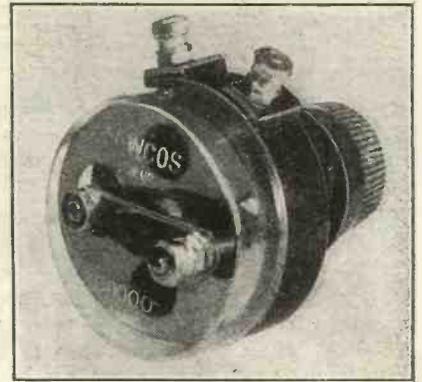
The New "Camco" Range

It has been said that "a country's radio is judged by its cabinets." And there is a great deal of truth in that. However magnificent a set may be from a purely technical point of view, there is no gainsaying the fact that the average listener will not be greatly impressed unless it looks nice as well.

The modern radio set must appeal to the eye as well as to the ear. Shortcomings in the appearance of a set were readily forgiven or even encouraged in the earlier days of broadcasting, but the magic and mystery of wireless having given way to a large extent to more prosaic requirements, cabinets have assumed an important position in the industry.

The Carrington Manufacturing Co. were pioneers in the "better appearance for radio" movement, and their present catalogue adequately illustrates that they have well maintained their reputation, and have, at the same time, made it possible for all to obtain good cabinets within the limits of their means.

The "Camco" Gresham cabinet for radio-gramophones is an excellent example of "Camco" craftsmanship and inexpensiveness. Its form and design can be estimated from the accompanying photo, but the actual thing must be seen for its finish and polish to be appreciated fully.



A new component due to Lewcos, the famous wire makers.

For Modern Sets

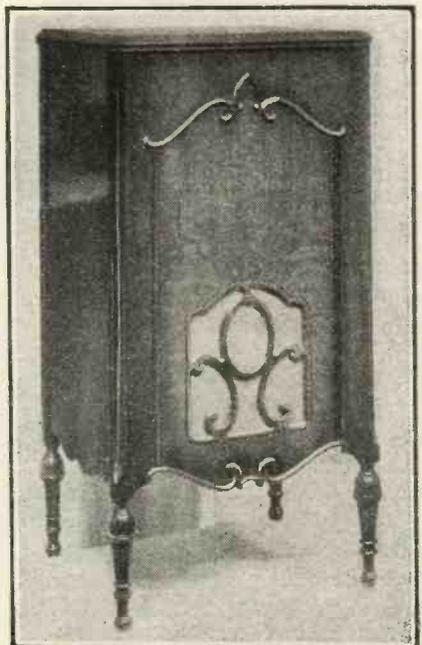
It is often essential to employ shielded leads in modern radio sets, and in many cases indeed it is decidedly advantageous to do so.

For example, it sometimes happens that the only point at which component shielding or incidental screens fail to operate effectively is at the anode connection of an S.G. valve. Screen this and, perhaps, complete stability is secured instead of an "on the edge" condition.

Remax Cables are now supplying a screened wiring kit which is just what is required for such jobs.

It comprises a 3-ft. length of closely braided, tinned-copper sleeving, tinned-copper flexible connecting wire, and twelve combination soldering tags and earthing clips. The complete kit costs 1s.

A HANDSOME CABINET



The "Camco" Gresham model for radio-grams.



Is the battery radio-gram worth while? An answer to the critics.

By "TONE-ARM."

I HAVE been having quite a heated argument with a quite experienced listener over the somewhat vexed question of battery radio-grams and the provision of pick-up facilities on the ordinary battery set.

My "contestant" was (and to some extent still is, I fear) of the opinion that the battery radio-gram (whether H.T. is from battery or smallish mains unit) is a failure and "ought never to be allowed." I quote his own words.

So Far So Good

His contention is that it is hopeless to expect the results of a big radio-gram from a small-powered set that cannot at the most (except by using the new pentodes) deliver more than 350-400 milliwatts to the loud-speaker.

He is obviously right. I will go with him and others who think the same way, so far. But, although I agree that the mains outfit is undoubtedly the better of the two, I do not consider the battery model is, as he put it, a "waste of time."

When one has been listening to a full-blooded 5-watt mains output thumping out an orchestral record (with too much "bass" as a rule), one is liable to be dogmatic about one's views on the smaller fry. Unless, that is, one remembers one very important point.

A Cameo Picture

That one is not trying to reproduce the *original* when one plays a record (especially the orchestral or organ types); one is merely trying to paint a true cameo picture. The "size" of the picture depends on the "power" of the set and the faithfulness of the painting, its "likeness," depends on the technical excellence of the set.

Let us take photography as an example of what I mean. I see a

beautiful landscape in real life. I photograph it. That photograph, every time I look at it, not only gives me a pleasant reminder of the original, but it forms a picture that is pleasant for its own sake; having its own beautiful points.

Worth While In Itself

It does not need a stereoscopic device to make me enjoy the picture. Such a photograph would add to the impression of reality, but the ordinary print is good and worth having in itself.

Colour it artistically and it should be better, but it must fail to be the original.

Now back to radio-grams. Listen to the Queen's Hall orchestra, or to Henry Hall, or anyone you like. Then get the record of the same item and play it over.

You will get a recollection of the original, with powers of recalling that depend upon the excellence of the record and that of the device on which it is played.

All Give Pleasure

The mains set is the coloured photograph, or the stereoscopic view, while the smaller reproducer and even the acoustic gramophone form the snapshot.

All give pleasure; but obviously the better the camera (the reproducer) the better the picture.

Also, others who have not heard the original will enjoy, for its own sake, the "picture," whether it be snapshot or full-coloured reproduction.

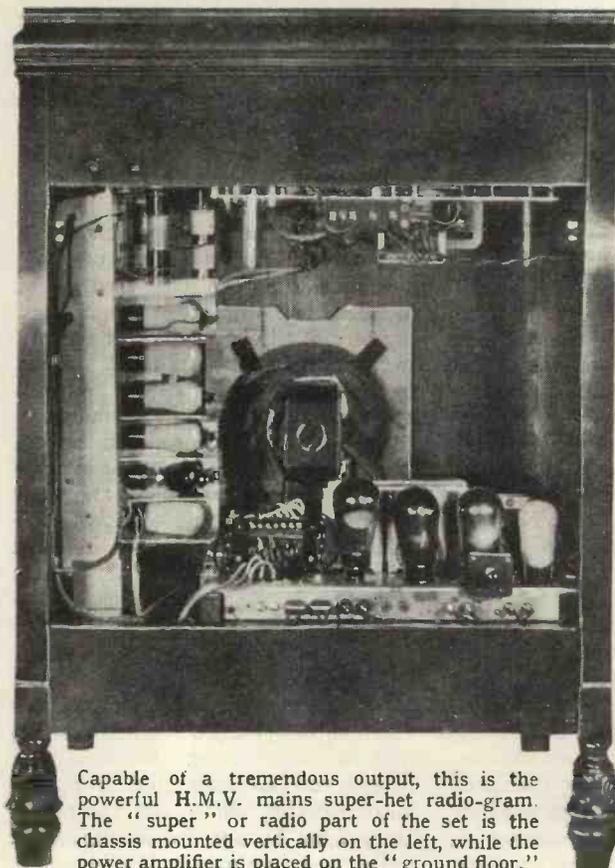
So, it is not right to push the lowlier battery radio-gram out into the cold among the unwanted. It is better in its balance of musical reproduction than the acoustic gramophone. It cannot compete with the powerful mains set as regards the "size" of the

"picture," but properly designed and handled (and that means not trying to get mains volume out of it), it will give a delightful "snapshot."

These "box cameras" of radio give plenty of entertainment, and just as with photography it is obviously foolish to say that because you cannot have a full-plate camera, or the latest reflex or ciné, you will have none of it, so it is with radio foolish to condemn the battery outfit.

I have a mains radio-gramophone. If I had no mains (as was the case not long ago) I should have a battery radio-gram (as I did at that time), and I should (as I did) enjoy it to the full.

FOR FULL-POWER PROGRAMMES



Capable of a tremendous output, this is the powerful H.M.V. mains super-het radio-gram. The "super" or radio part of the set is the chassis mounted vertically on the left, while the power amplifier is placed on the "ground floor."

Programmes Which Bear Repetition

In fairness to the B.B.C., I hope that several critics will make a note of this.

Birthday Cake, Please!

How many of you remember the days of the informal staff parties at Savoy Hill, when we were all invited to join in a kind of glorified children's hour? We used to marvel then at the talent and versatility shown by the staff.

B.B.C. officials are no less talented to-day, but their talents are buried so deep that we have no chance of appreciating them properly.

I should like to see Sir John Reith have the courage and foresight to hand over the Birthday Week programmes next month to John Watt, Gordon McConnel, Howard Rose, and a few more of those bright young men for whose services the film studios of Hollywood and Elstree are striving so hard at the moment.

Well, Well!

How's this for the most amazing criticism of radio plays ever published? The Radio Correspondent of a daily newspaper complains that many listeners have not the time to devote to a full-length play, and if they turn on their sets in the middle they are quite unable to understand what it is all about.

Many of you have probably read newspaper articles right through without discovering what they were about.

Worth Doing!

Since those early days when John Watt used to produce jolly musical shows from the Belfast studio, I have always had a great admiration for this talented producer's ideas, even if I have not always been in the mood for his productions.

I was, therefore, pleased to see that "Love in Greenwich Village," first produced in 1929, was considered worthy of revival last month.

Bringing an eighteenth-century

I hope that there are other eighteenth-century musical pieces which lend themselves equally well to such adaptation.

Doctor Stone

The S.O.S. broadcasts are not the only part of the programme to provide real-life drama. Christopher Stone—funny how he creeps into these notes every month—has just revealed the details of a mysterious remark in one of his recent programmes.

Stone apologised for not having a record of the "Londonderry Air" and hoped that "Connie" would understand.

It appears that "Connie," deaf from birth, put on a pair of headphones one evening and was able to hear after twenty years of silence. "Connie's" aunt thereupon wrote to Christopher Stone and asked him to play a record of the "Londonderry Air," a tune which her mother, now dead, had regretted that "Connie" would never be able to hear.

It must be most encouraging for regular broadcasters to be treated as personal friends by hundreds of listeners whom they are never likely to see.

Congratulations

Congratulations to Dulcima Glasby and Howard Rose, author and producer of "Obsession," the best play of the month, and probably the most universally appreciated radio drama ever broadcast.

Also to L. du Garde Peach for his "Tales of the Tower of London," which are doing much to brighten up the Children's Hour programmes.

P. C.

In the Programmes.

GARDA HALL



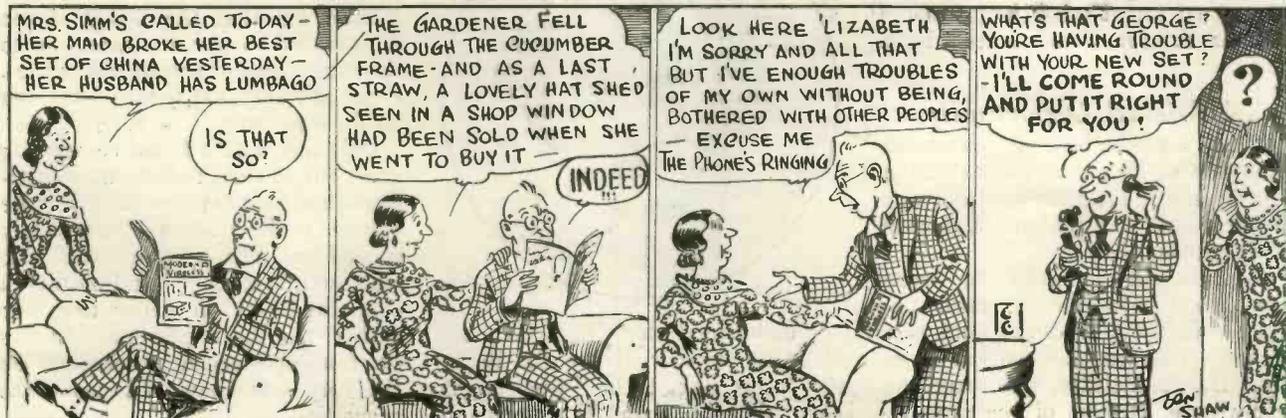
After becoming popular as a concert singer, Miss Garda Hall made her first broadcast from Savoy Hill in 1927. The enthusiasm which she aroused on this occasion has been repeated on frequent evenings since then!

John Watt has featured her in several of his "Songs from the Shows" programmes, and Miss Hall made a recent appearance at Broadcasting House in "Suitable Songs," when she gave an excellent demonstration of how wireless sopranos ought to sing! Garda Hall has also recorded several of her songs for the gramophone.

show up to date is no enviable task and is likely to produce more kicks than ha'pence. But John Watt, in conjunction with George Barker, who arranged Dr. Arne's music with sympathetic skill, succeeded where less brilliant men would have failed dismally.

A MAN AND HIS MOOD

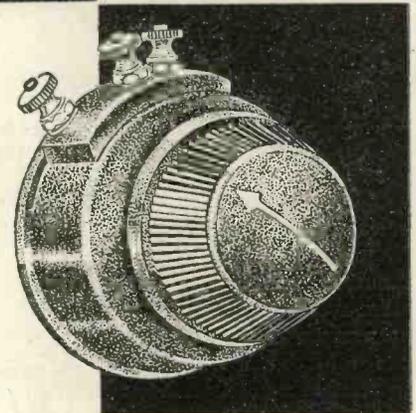
By ERN SHAW



RADIO
IGRANIC
DEVICES

LOGARITHMIC VOLUME CONTROL

The IGRANIC Logarithmic Volume Control is wire wound and fitted with a specially graded resistance track. It has been evolved to afford a uniform control of volume where a valve or valves of the Variable Mu type are employed in the circuit. The graded resistance makes the volume control obey the same law as the valve. Sizes: 5000, 10,000, 50,000 ohms, and they can also be supplied with combined switch. Price 5/6, with switch 7/6

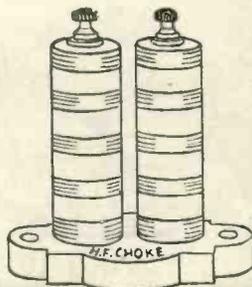


IGRANIC
COMPONENTS WILL
BE THE MAKING
OF YOUR SET.

IGRANIC H.F. BINOCULAR CHOKE

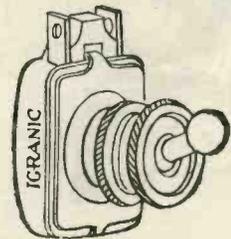
The H.F. Choke for all modern valve circuits. Exceptionally efficient over range of 150 to 2,500 metres and complete absence of peak effects. The mounting ensures complete insulation from baseboard.

Price 3/9.



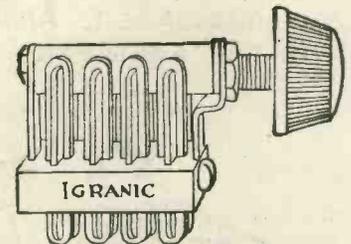
IGRANIC MIDGET RADIO SWITCH

A neat, compact component specially suitable for switching filament current "on" and "off." Moulded bakelite with heavily plated metal front—one-hole fixing. 1 amp. at 250 volts; 3 amps. at 125 volts. Prices, with terminals, 1/8; with soldering tags, 1/6.



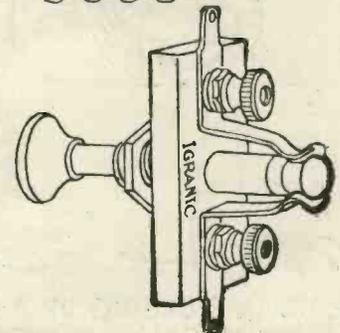
IGRANIC ANTI-CAPACITY SWITCH

For use in all circuits where self-capacity in a switch must be reduced to a minimum. Excellent springs ensure positive contact. Well-spaced soldering tags. Semi-rotary movement. One-hole fixing. 2-way Change-over Switch. Price 1/9. 3-way Ditto .. Price 2/-. 4-way Ditto .. Price 2/6.



IGRANIC PUSH-PULL SWITCH

Smooth action and positive contacts. Terminals and soldering tags on ebonite strip. All metal parts nickel-plated, reducing resistance to a minimum. One-hole fixing. Price 9d.

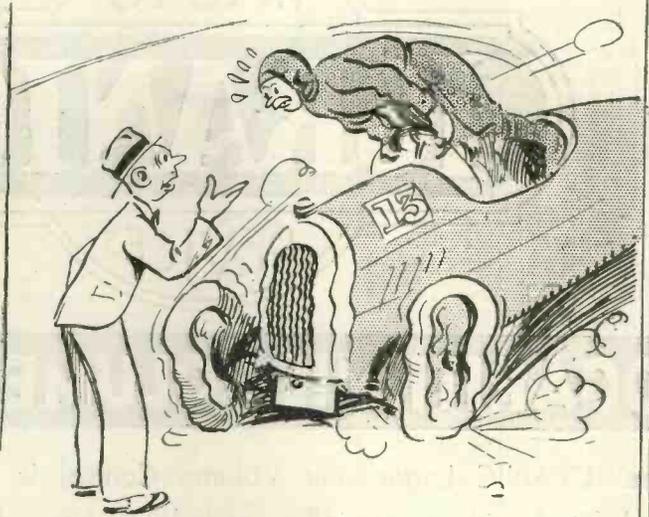


Write for Catalogue J.1199 to Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.

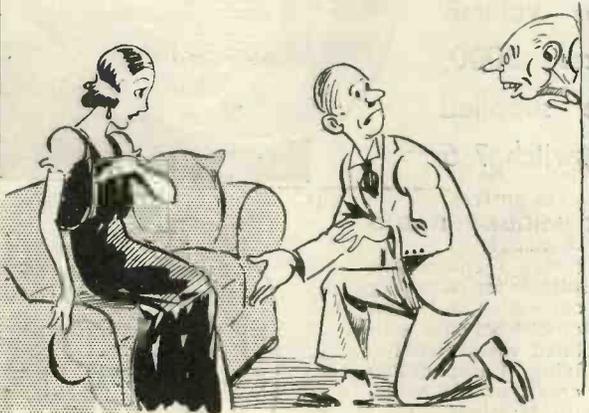
THERE'S A TIME AND PLACE FOR EVERYTHING



THERE IS AS MUCH SENSE IN SUPERIMPOSING THAT "PIP-SIGNAL" ONTO AN INTERESTING BROADCAST ITEM



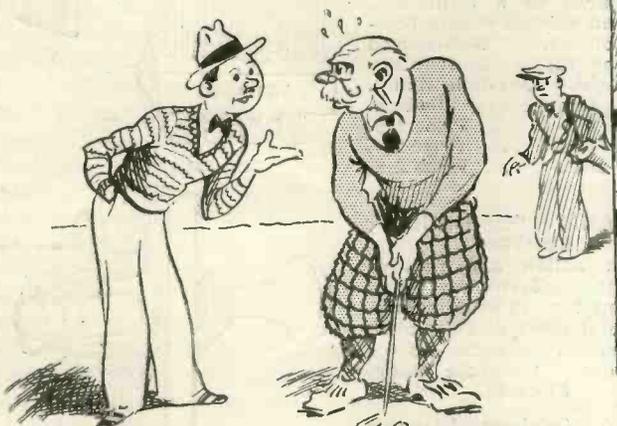
AS THERE WOULD BE IN STOPPING A RACING CAR TO TELL THE DRIVER THAT RUBBER SHARES HAD DROPPED TWO POINTS—



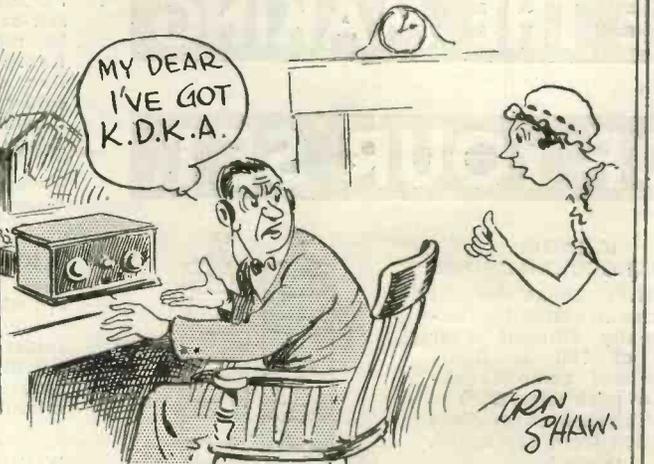
—OR IN INTERRUPTING A PROPOSAL OF MARRIAGE TO ANNOUNCE AN INCREASE IN THE AMERICAN DIVORCE FIGURES



OR IN WAKING A SOUND SLEEPER TO TELL HIM ABOUT A PYJAMA SALE AT THE LOCAL STORES



—OR IN HOLDING UP A MATCH-WINNING PUTT TO TELL A GOLFER THAT BONEMEAL IS GOOD FOR GREENS



OR IN TRYING TO CONVINCE A SHORT-WAVE ENTHUSIAST THAT — "EARLY TO BED — ETC."

ERN SHAW



IN PASSING

The Kidnapping of Dr. Thunk

THE people who catch Tartars are mostly very clever—and, if Tartars are of any use to them, they are welcome to them. The Tartar-catching industry—but that is not my subject this month. Rather would I open out on prophets. Now, prophets are deserving of our compassion, for they get Kalamazoo if their prophecies don't come right, and if they come right everybody is so excited that the prophet is overlooked and the "Daily Mail" gets all the credit. That's business.

We are all prophets, in a minor way. You, respected reader, prophesy to your lady wife that young Egbert is in for a dose of measles. Whereupon she writes you down as a scare-raiser—but privily sends for the doctor, who announces scarlet fever! You get no

HOMeward BOUND



"—was walking along Alma Crescent, Sydenham."

credit, but are, in effect, stamped as a kid-killer, an alarmist and—almost—a purveyor of scarlet fever, by suggestion. Such is the way of the world and women!

Now list to my story. Professor Ignatius Thunk, who discovered that great star, *Alpha Thunkii*, and fifty years later discovered that *Alpha* did

not exist—owing to a mistake in some algebra—was walking along Alma Crescent, Sydenham, one night in June, after having regaled the Royal Society of Arts with a paper entitled: "Cyclical Variations in the value of minus infinity to the sixth power of q , with j as an operator."

How It Began

Having left, as I have said, the members of the R.S.A. edified but slightly dazed and inclined to go gay on "bubbly" (with oysters as operators), Dr. Thunk wended his weary way homeward, namely and to wit, to No. 13, The Drive, Sydenham.

His gait was deplorable. Many waifs, seeking fag-ends in the gutters, could have given him points in deportment. For where they seemed to cultivate the gutter, he passionately

This month Dr. Thunk, the discoverer of Alpha Thunkii—the famous star that never existed—has the amazing experience of being kidnapped by a fanatical radio experimenter. He accidentally discovers that he is required for certain death-ray tests, and with his usual presence of mind manages to delay the gruesome experiment, the police arriving just in the nick of time.

wooded it. He had once broadcast a talk on "Mud, Myopia and Megacentrism," which had detonated no less than nine European schools of thought and had caused Mr. J. P. Morgan to subscribe twenty billion dollars to the foundation of an American school of thought, the explosion in Europe having revealed a deficiency in the States. Since then, Dr. Thunk, as I have just stated, invariably regarded mud myopically.

Now, Dr. Thunk, as he jolted and swayed along Alma Crescent, was prophesying to his inner man that in ten minutes both of them would

be sitting down in No. 13, The Drive, before a dish of macaroni cheese, which of all dishes was their favourite. It was the surest bet possible. And yet in two minutes Dr. Thunk, gagged and bound, was speeding in a car to the home of a radio "fan," and also to within some few millimetres of Kingdom Come. Life is so very full of surprises, as the wart-hog said when it saw Wallace Beery as "The Champ."

The Hold-Up

The car was drawn up at the side of the road, close to the pavement, thus obscuring a part of the doctor's

TIGHT COUPLING!



"—skilfully gagged, his ankles and wrists being bound."

gutter. The doctor, therefore, slouched nearer to the middle of the pavement in order to pass the car. He did not pass the car, however, for as he drew level with the driver's seat strong hands lifted him up and popped him into the vehicle in five seconds; there he was skilfully gagged, his ankles and wrists being bound. The car then moved off.

For some minutes Dr. Thunk had the company of a large, bony man with black moustaches, who stared at him hard, and a little later stopped the car and transferred to the seat beside the driver. Those few minutes had, however, been occupied by Dr. Thunk in some of the quickest and clearest thinking he had ever accomplished

"Just a Practical Joke, Sergeant," sniggered Dr. Thunk

Had he given voice to his thoughts, his words would have been like these.

"Tut, tut! Most uncalled for! Bonds, gag, but *not* blindfolded. Hence we have either a comparatively harmless practical joke or—I may not be expected to come back, so that there would be no object in blindfolding me. I incline to the latter theory because people do not play jokes on me. Besides, one of them is a foreigner—a Belgian, I think—and they look too serious and are very hurried and nervous. For instance—"

An Electric Chair

At this point Dr. Thunk became a man of action, and was very busy until the car stopped at a large house in Beckenham, when he was dragged out of the car and his bonds torn off; those on his wrists were very loose, as though he had been working at them. Dr. Thunk did not seem to be greatly perturbed; in fact, he got as near a chuckle as ever he had done—and until the door closed behind him he kept craning his head round in order to look at the evening sky.

He was led up a staircase and conducted into a large room which had the appearance of a radio amateur's laboratory, a fact which our hero was quick to recognise because of his earlier dealings with a "fan" named Jones, who used to write articles for MODERN WIRELESS.

ALL FROM THE MAINS!



"—a grim-looking chair, all belts and buckles, reminiscent of America's electric chair."

One particular layout of gear dominated the rest; exactly opposite to it, against the wall, stood a grim-looking chair, all belts and buckles, reminiscent of America's "electric chair." Thunk took all this in with a comprehensive glance and awaited developments.

Presently a man emerged from an inner room. He had the slightly protuberant eyes and trap-like mouth of the fanatic.

"So you've got one," he said. "Pull out the gag."

Thunk kept silence, waiting for the next move. The man, who the others addressed as Louis, suddenly stared at the doctor's hands, finger-nails, collar and boots.

The Wrong Man

"This is not a vagrant, a homeless wanderer, he said, slowly and menacingly.

The others looked, also. Thunk lowered his eyes and pretended to be scared stiff.

"You fools!" said Louis pleasantly. "Look at his shirt—finest silk! Look at his hands—a gentleman's! Look—"

"But, Louis," burst forth the Driver of the Car, "he was shambling along, searching the very gutter—er—for the little pieces of cigarette."

"I stole 'em," quavered Thunk. "You ain't a-goin' to give me away?"

"Oh, no, my friend!" said Louis. "It's a mistake." Here he scowled at the Two Kidnappers. "You can go!"

"But, Louis," cried the Gagger, "will he not serve?"

"Look at those hands! Did you see his teeth? You muddlers!"

"Plenty of down-at-heels gents about," muttered the Driver.

"Attend!" said Louis. "You—who are you?"

Thunk made a movement as though to pull a forelock.

"Arthur Montgomery Brown, sir. Brung down by strong drink. No home; no friends. I picks up fag-ends and sells 'em to the Jews. Have you got any grub? Nothing to eat since yestidy. Me ears is singing!"

Explanations

"You liar! Why are you wearing silk? Why are your hands so clean?"

"A good mother, sir! Cleanliness and holiness, anctetra. Pinched the shirt orf a line."

"Well, Mister Brung Down by Strong Drink," said Louis, "tell me"—here he fairly rapped the question out—"tell me the value of π ?"

A light flickered in the "vagrant's" eye.

"Ar," he said, lickin his lips, "threppence on Deptford Broadway, but I reckons they're made o' kitten, not rabbit."

"All right," said Louis to the others, "go downstairs and wait."

Louis then came nearer to Dr. Thunk.

"I suppose you want an explanation of why I had you brought here, eh?"

"No, guv'nor; not if there's any money in it."

"You've heard of wireless, I suppose? Even you have heard of it. Well, I am an experimenter, and I need the opinion of an absolutely

A RADIO RESCUE



"—and five policemen burst into the room."

unbiased, uncritical observer. You see, the experts are all divided up into schools; some think this, some that. I want the views of a man, say, like yourself, who doesn't do a lot of thinking. I want the virgin mind, the blank tablet."

"Yussir!"

The eyes of Dr. Thunk wandered idly over the medley of coils and batteries; then they dulled, almost glazed, in their unseeingness.

The Bribe

Louis began again: "So I took the liberty of—er—borrowing you for a couple of hours. All I want you to do is to sit back in that chair and give me your opinion of various loud-speakers."

"What's all them strops, guv'nor?"

"Nothing at all! My grandpa used to have fits. Sit down and smoke."

Dr. Thunk remained silent for a full half-minute, listening! Everything seemed very quiet. Very much too quiet! Louis began to move towards the apparatus.

"No; I think I'll go, as you said, guv'nor. I 'ates wireless!"

"Sit down and listen, and I'll give you a quid."

"Ar, that's talking, sir! Okay, I'll sit down. Give us the quid first, though."

Louis fumbled in his pocket, held out a pound note, and reached for a switch.

(Continued on page 412.)

SOME NEW PRECISION INSTRUMENTS



J. B. UNITUNE GANG

Rigid one-piece chassis as NUGANG. Trimmer of front section is operated from receiver panel by a knob concentric with main tuning knob. Capacity .0005. Complete as illustrated, 2 Gang 18/6, 3 Gang 27/-.

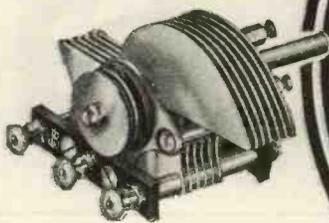
J. B. NUGANG

Rigid one-piece chassis—very robust construction. Capacity .0005, 2, 3 or 4 Gang. Prices semi-screened, as illustrated, 14/-, 21/-, 28/-. Fully Screened, 16/-, 23/6 and 31/-.

NUGANG, Type "A," complete with Disc Drive. Semi-Screened, 16/6, 24/6, 31/6. Fully Screened 18/6, 27/- and 34/6.

J. B. SUPERHET GANG

Similar to the "Nugang" but modified for superhets. Capacity .0005. Fully screened, 3 Gang 25/6, 4 Gang 33/-. Semi-screened 23/- and 30/-.

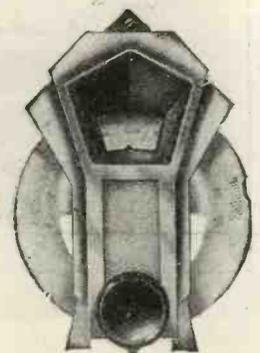


J. B. SHORT WAVE CONDENSER

With many novel features, very low minimum capacity. Special screened pig-tail to rotor. Capacities .00005, .0001, .00015, .0002, .00025, all 5/9 each.



CONDENSERS & DIALS
WRITE FOR NEW CATALOGUE



J. B. ILLUMINATED DISC DRIVE

For use with the new J.B. Gangs. Extremely powerful. Ratio 12/1. Sloping Scale and Hairline Visor. Complete with full-length escutcheon in oxy-silver or bronze finish, 4/9.

THE WATES "FUTURA SIX" RECEIVER

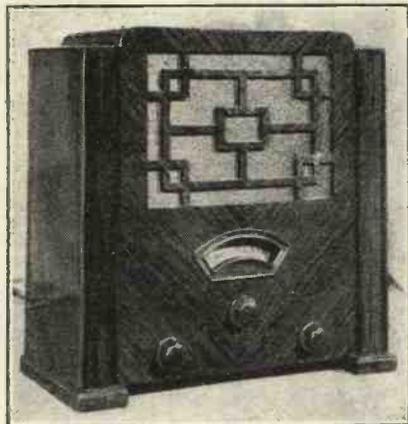
A sensitive and selective set that employs two variable- μ S.G. valves. It was recently tried out by a member of our technical staff, who tells you something about its interesting features.

RECENTLY Messrs. The Standard Battery Co. sent us one of their "Futura" A.C. mains receivers for test. A perusal of the descriptive and instructional pamphlet which accompanied it left us in no doubt as to what Messrs. The Standard Battery Co. thought about the set.

They considered it to possess to an abnormal degree the two attributes which every wireless user wants, but which are generally so difficult to obtain simultaneously—selectivity and sensitivity. So keenly, in fact, did the pamphlet stress these features that it quite forgot to call attention to the appearance of the set which, incidentally, deserves praise.

A Five-Valve Circuit

Having ascertained the maker's opinion of his own product, we then prepared to test the set and record for "M.W." readers our own impressions.



First of all, investigations were made to discover the nature of the circuit, and the fact soon emerged that two S.G. valves were employed, followed by a detector, one low-frequency and one power valve—five valves in all; certainly an arrangement likely to give all the sensitivity claimed by the makers. Moreover, the use of two S.G. valves necessitates the provision of at least three tuned circuits, so that only very bad design could make the set unselective.

Both the S.G. valves are of the

recently introduced "variable- μ " type, so that a particularly effective form of volume control can be achieved.

Highly Selective

On test, with a fairly large outdoor aerial at some ten to fifteen miles from Brookmans Park, the set manifested extremely selective properties. The slightest turn of the tuning dial from the positions marked resulted in a complete cessation of reception from either the London transmitters and, after dark, the immediate reception of numbers of foreigners.

The dial has a generous open scale, marked in degrees and illuminated from behind. All the most important long- and medium-wave stations have their names printed on the translucent dial over which a pointer travels.

It was found that the positioning of the station names was dead accurate for the London National, London



EXTERNALLY AND INTERNALLY AN EXTREMELY NEAT DESIGN

Appearances and accessibility are strong points in the design of this efficient receiver, which incorporates a moving-coil loudspeaker and a valve rectifier. The three tuned circuits are all controlled by one knob.



Regional, North Regional, and Midland Regional. These stations being B.B.C. transmitters, the accuracy of their wavelength keeping can be accepted with confidence. All these stations could be found immediately at full loudspeaker strength at Tallis House by merely moving the pointer to the names on the dial.

Well-Planned Layout

A point about the design of the set which particularly appealed to us

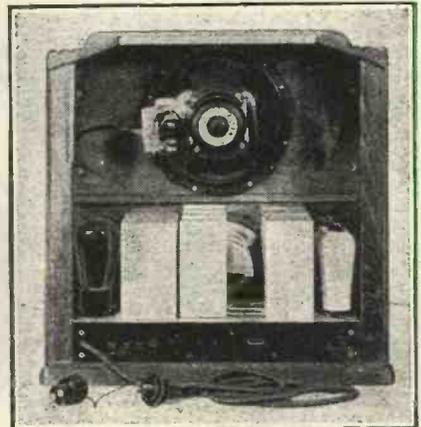
was the accessibility of those parts of the receiver which might—if occasion arose—receive service at the hands of a competent local dealer.

For instance, the three-gang tuning condenser (an excellent piece of work, by the way) was so mounted that the trimming condensers on each section could be adjusted without having to probe into a dark interior with a bent screwdriver! Valves, too, could be removed without risk of smashing them against the loud-speaker, or any other part of the set.

The non-technical user also should have little difficulty in doing his small part in installing and running the set. A feature which will appeal to many is the fact that the end of the long connecting lead to the mains is equipped with a "universal" type of plug, allowing either a "power point" or lamp-socket to be used for connecting up to the mains.

One-Knob Control

No reaction is employed and the absence of this control on the panel makes the set really a "one-knob affair." There is, in fact, only one other adjusting knob—that which controls volume. Adjusting this to zero automatically switches off the set. Incidentally, the absence of reaction control removes from the "Futura Six" that bugbear of so

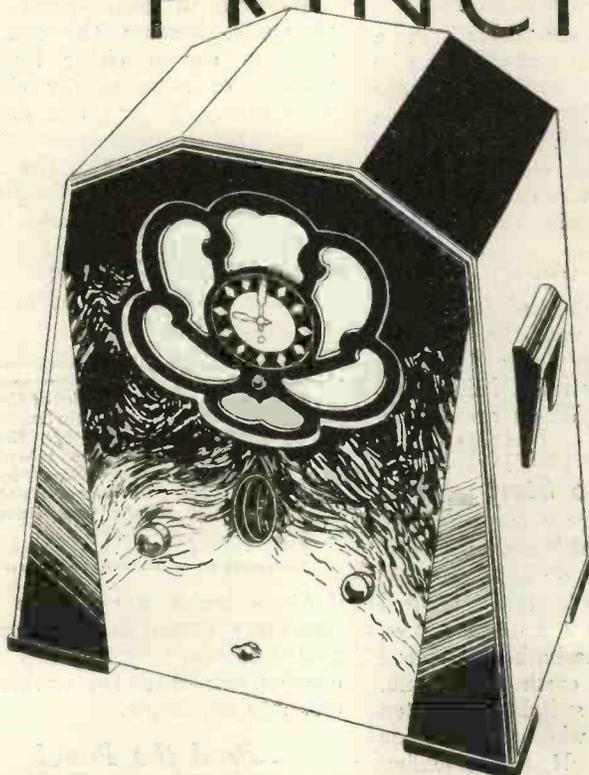


many mains receivers, "floppy" reaction on the long waves. There is, in fact, no difference whatever in the behaviour of the receiver on either waveband.

There are, in all, three separate models of the receiver available. The "Table Model" (the one we tested) is priced 18 guineas. The "Console" model is housed in a cabinet on pedestal legs and costs 23 guineas. There is also a "Radio-gram" which incorporates a special gramophone motor with automatic stop.

BY FERRANTI- THE PERFECTION OF THE SUPER - HETERODYNE PRINCIPLE

Technical men are enthusiastic in their praise of the foresight shown in the design of the Ferranti 7-Valve Super-Heterodyne. This new receiver provides the sharp selectivity and freedom from interference demanded by modern conditions—and something more. For the Ferranti designers realised the vital importance of ensuring that no microphonic vibrations should occur in this super-sensitive super-heterodyne receiver, and made special provision for this purpose. Accordingly, the whole chassis is non-microphonically mounted on resilient rubber. This is just one instance of the care taken in perfecting the Ferranti Super-Heterodyne to the highest standard of efficiency yet attained. **INSIST** on the FERRANTI Super-Het—if your dealer is out of stock, he can get one.



The design incorporates the most modern features, including INITIAL H.F. AMPLIFICATION, preventing interference with other sets; VARIABLE MU VALVES, providing the best form of volume control; GANGED CONDENSERS, giving one knob tuning; BAND PASS COUPLING, ensuring high selectivity without loss of high notes; MOVING COIL SPEAKER, for high quality reproduction; TONE CONTROL, to provide sharp or mellow tone at will; ILLUMINATED WAVELENGTH SCALE, giving instant station identification; AUTOMATIC MAINS AERIAL DEVICE, enabling the Receiver to be moved easily from room to room and used wherever an A.C. light or power socket is available; and provision is made for GRAMOPHONE PICK-UP.

CLOCK MODEL,

incorporating Ferranti Electric Clock and Station Dial—for time controlled frequencies only—25 GUINEAS, or Deposit 45/- and 12 Monthly Payments of 44/-.

STATION DIAL MODEL, 23 GUINEAS

or Deposit 43/- and 12 Monthly Payments of 40/4d.

STANDARD MODEL,

as described in specification, with wavelength indicator. 22 GUINEAS or Deposit 42/- and 12 Monthly Payments of 38/6.

FERRANTI

7-VALVE SUPER-HET

Suitable only for 200/250 volts A.C. supplies having frequencies between 40 and 60 cycles.

For illustrated literature write to

FERRANTI LTD., HOLLINWOOD, LANCS. AND BUSH HOUSE, LONDON, W.C. 2.

TROUBLE TRACKING



ONE of the commonest faults I know of is crackling; every receiver seems to suffer from it some time or other in its life.

Crackling can be caused in a variety of different ways. It can be picked up by the aerial from some external source, it can come in via the mains in the case of sets that are working from the electric lighting supplies, or it can be due to a defective component, joint or contact in the set itself.

Let us suppose that this crackling has suddenly developed in the receiver, and that you, the owner of the set, are at your wit's end to know how to track down and remedy the irritating fault. Where are you to look?

How to Start

Well, there is only one way, and that is to set about it systematically. The first thing to do is to find out whether the noise is coming in from the outside, or if it is the set itself that is causing the bother. Remove your aerial and earth leads, and, with the receiver switched on, listen carefully and note whether the trouble still continues. If the crackling ceases immediately the aerial and earth are disconnected, then it is

quite obvious that it is the aerial and earth system which is picking it up.

Remedies in this case are difficult to apply, because the trouble is normally caused either by atmospheric or some nearby electrical machinery. If you can definitely identify the electrical apparatus, your best plan is to write to the B.B.C., who are able, with the help of the Post Office authorities and the co-operation of the owners of the offending apparatus, to apply various remedies according to the nature of the interference.

Every month the Chief of the "M.W." Query Department discusses some of the common difficulties which can often be so troublesome. This time he deals with crackling noises and their location.

Atmospherics are always of a temporary nature in this country—that is to say, they may last for an evening, or perhaps two or three, but certainly not longer.

Prod the Panel

Suppose the set itself is found to be at fault, the first thing to do is to go over all connections and see whether any of them are loose. It is not a bad idea to give the panel a smart tap, noting whether this accentuates the trouble. If it does, then there is probably a faulty joint or contact in one of the components near the panel, and in this way it is frequently possible to localise the fault.

If you have any spaghetts in the set, these should immediately come under suspicion, especially if you happen to have tied a knot in one of them.

Next press the valves well home in their sockets, and look over the tuning coil windings, and also the connections between the fine wire windings of H.F. chokes and their terminals. Occasionally an L.F. transformer or iron-cored choke may give trouble, but in these cases the

only remedy is to substitute another component, because you cannot repair this fault yourself.

When the crackling comes in from the mains it is usually accompanied by a certain amount of hum and, possibly, mushiness. Each case must be taken on its merits, but it will be found that the insertion of an H.F. choke in the mains lead, and a large by-passing condenser across the set side of the chokes, will definitely be an advantage.

Some Useful Suggestions

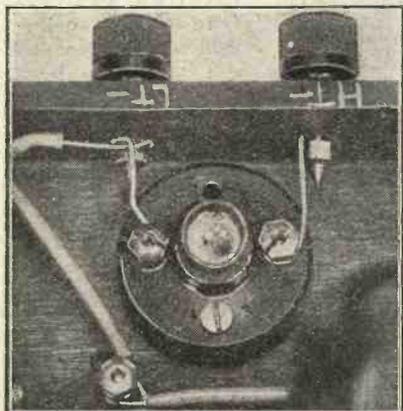
In nine cases out of ten crackles are due to something loose in the set; it is surprising how easy it is to produce the trouble artificially. Often a very slight loosening of a switch contact is sufficient.

The reason is that when a set is placed upon a table it is constantly in a state of vibration, these small movements being transmitted to it via the floor upon which the table is standing. Traffic passing the house, and people walking about, all cause these small vibrations, and consequently the listener hears a series of crackles in the speaker due to the varying resistance of the contact.

So far I have said nothing about batteries, but there is no doubt whatever that much of the crackling one comes across is produced by the battery leads and the bad fitting of the wander plugs in the battery sockets. Wander plugs should always be a good tight fit, so that they cannot shake about and make intermittent connection. Moreover, the plugs and sockets should be clean.

Sometimes the flexible lead is faulty, and, of course, the loudspeaker itself is not above suspicion, so the possibility of a defective winding must not be overlooked.

WORTH KNOWING!



This is an important point! When a fuse bulb is inserted in circuit between H.T.— and L.T.—, the lead to the filaments of the valves should always be taken from the L.T.— terminal, and not from the H.T.— terminal as is sometimes the case.

AT YOUR SERVICE



by
**OUR TRADE
COMMISSIONER**

Interesting Igranic Innovations

I HAVE just been studying the latest catalogue and leaflets issued by the Igranic Electric Co., Ltd., and many interesting features have been brought to my notice. In the first place, gang condensers at competitive prices are included in the 1932-33 range of components, while the transformer at 5s. 6d. should have a ready sale.

Moving-coil loudspeakers, tapped pentode chokes, super-het. coils, chokes, mains transformers, potentiometers, strip resistances, switches, and so on, are among the large range of new and old lines that fill the various leaflets and the main catalogue of this go-ahead firm.

All set constructors should make a point of getting a copy of the main catalogue, which Messrs. Igranic Electric will be only too pleased to send on request.

The Secret is Out

"Formo has a secret that interests you" is the intriguing title of the latest Formo catalogue, and the contents certainly live up to the expectations engendered by the title.

One of the brainiest features I have seen for some time has been incorporated in the Formo canned coils. It is the simple idea of sticking a disc of card on the top of the coils, inside the can, with the circuit connections clearly drawn on it. The various coils are covered with different coloured cans, according to the type of coil. Thus aerial coils are one colour, band-pass another, and H.F. coils another.

A second interesting new line is a coil and condenser assembly mounted on a metal chassis for either two or three tuned circuits. It should greatly assist the home constructor, and is very reasonable in price.

The Formo canned transformer, an L.F. component thoughtfully shrouded in a cylindrical iron case to

Some trade news and views that are of interest to readers, whether or not they are connected with the radio industry.

Members of the trade are invited to send items of interest, or photographs, to be included under this heading.

match the coils, is a new innovation, while the shunt-fed model, the multi-coupler, is another instrument to which attention should be directed by all who get the catalogue. This latter, by the way, is available for any who send to the makers at Crown Works, Southampton, or at the London offices, at 23, Golden Square, Piccadilly Circus, W.1.

Radio Instruments

The Parafeed coupling unit is one of the outstanding new lines in the latest R.I. catalogue. It is claimed to have a straight-line response curve

over the major portion of a 25 to 8,000-cycle frequency range. The super-heterodyne receiver is the subject of a separate brochure, which fully describes the set and its capabilities.

Naturally, the many well-known R.I. components that have seen the light of day recently are given due space, and the catalogue is a very interesting and useful one. Messrs. Radio Instruments cover practically every field of radio reception, and their transformers have been world-famous for many years.

Which is Which?

The trend of design in the home-construction components' sphere is becoming more and more towards cans. Coils have been canned for some little time, and now to match them the other components in the average set are appearing with metallic garb.

A WINNING SHOW AT "THE SHOW"



Second prize in the Stand Design Competition at Olympia was won by H.M.V., a general view of whose exhibit is seen above.

News and Views of the Trade

This is all to the good in some respects, for it will greatly add to the appearance of a receiver if some similarity of design in the components is achieved.

Many firms are taking up the sort of light admiral grey (or is it a duck's-egg green?) colour for their cans, and the shape is also becoming fairly standardised.

So close indeed is the appearance of some of the different components in general outline that a quite understandable error crept into the exhibition section of "M.W." last month.

In this case the photograph of a Benjamin Transfeeda was described as being one of the Colvern T.D. coils, which in many ways it resembles. This is a striking example of the possibilities of matching components, and there is no doubt that these two go very well together in a set.

A Fine Production

I should like to pay tribute to the very fine production known as the Telsen Radiomag. Space prevents us from properly describing it here.

However, I would like to draw attention to the wide variety of

addition a full catalogue of Telsen parts, making it a most useful publication.

You should look out for it, it has an attractive cover and is of a size that should easily be spotted without being clumsy in the least, and when you have paid the mere 6d. asked for it you will consider it one of the best pieces of value you have had.

The "Skyscraper" Three

I hear that the Lissen "Skyscraper" kit is doing exceedingly well, and that it has already earned for itself the reputation of being one of the easiest kits to assemble, a reputation that it thoroughly well deserves.

The price, too, is right, for the plain kit costs only £4 9s. 6d., while with cabinet it can be obtained for £5, and the whole outfit, including speaker, can be built for £6 5s.

By the way, some misunderstanding may be caused by the figure given in page 200 of last month's "M.W."

The £8 17s. 6d. refers not to the "Skyscraper" ready made up, but to another three-valver that is available from the same factory. We

found, by experience, to provide the best all-round performance.

The Home-Constructor's "ENQUIRE WITHIN"

("Technical Tables and Glossary"; published by the British Broadcasting Corporation. 1s.)

WHAT is the technical symbol for a neutrodyne condenser? How many watts make one horse-power? What is the dielectric constant of porcelain? How does one determine the signal strength of a transmitting station?

Every radio enthusiast knows how these little problems keep turning up at the most awkward moments, usually when one is far away from any book of reference.

The B.B.C. is to be congratulated, therefore, on having issued, at a very moderate price, a handbook of technical tables and formulæ which can be conveniently slipped into the pocket or given a place of honour on the construction bench.

This handbook does not pretend to be a thorough encyclopædia of wireless terms and symbols, but the information it contains (most of which has been reprinted, with revisions, from the B.B.C. Year Book, 1931) has been carefully chosen to provide just that assistance which is constantly being needed by the home constructor.

A Very Useful Book

The full list of technical symbols, a table of logarithms, reciprocals, square and cube roots of all numbers from 0 to 100, Greenwich time variations for all the countries in the world, and a full technical glossary of nearly thirty closely printed pages, are the chief attractions of this very useful little book.

In all the seventy pages I have found only one piece of information which is never likely to be of any use to me. That is the sentence which informs me that "The Tonga Islands keep 12-20 mins. ahead of Greenwich."

"Technical Tables and Glossary" is invaluable for anyone who takes a practical interest in radio.

P. C.

LOTUS LEAVES LIVERPOOL FOR LONDON



A happy party of 200 Lotus workers who came to London specially to see the Radio Exhibition.

interesting, valuable and instructive articles that appear in number three of this publication.

The articles are practical and well-presented with ample illustration. Three blueprints of Telsen set designs are given away with the magazine, and this wonder mag. contains in

are informed that this set is a commercial battery three-valver and that it has no connection with the kit set.

The "Skyscraper" kit, of course, incorporates a circuit which has been specially designed for home-construction work, and which has been

EVERYTHING **The G.E.C.** ELECTRICAL
your guarantee

LATEST DEVELOPMENTS



PRICE
16/6

OSRAM 2-VOLT SCREEN-GRID BATTERY VALVES with the WEMBLEY FILAMENT

VS.2 (Metallized or Clear) PRICE 16/6

A new variable mu. valve with outstanding characteristics—long range, improved selectivity, adequate volume control, with only a 9-volt grid bias battery.

MUTUAL CONDUCTANCE 1.25 ma/volt at Ea 150, Esg 70, Eg. 0.
at Eg-9 0.05 ma/volt.

S.22 (Metallized or Clear) PRICE 16/6

The high slope screen grid valve to improve the reception of any three valve Kit set. Replace your old screen-grid valve with an OSRAM S.22.—A tonic to any set with single stage screen-grid.

MUTUAL CONDUCTANCE 1.75 ma/volt at Ea 150, Esg 75, Eg. 0.

S.21 (Metallized or Clear) PRICE 16/6

The screen-grid valve with new automatic OSRAM cushion springing and special non-microphonic construction. Designed for range with stability. A sensitive detector valve with entire absence of microphonics.

MUTUAL CONDUCTANCE 1.1 ma/volt at Ea 150, Esg 70, Eg. 0.

OSRAM
2-volt Valves with the WEMBLEY FILAMENT

PRICES

		PRICE
VS.2	Variable Mu. Screen Grid	16/6
S.22	High slope Screen Grid	16/6
S.21	Medium slope Screen Grid	16/6
H.2	High amplification Det. and RC.	7/6
HL.2	The non-microphonic Detector	7/6
LP.2	L.F. and Small Power	8/9
P.2	Super Power	12/6
PT.2	Economy Power Pentode	17/6

The OSRAM VS.2, S.22, S.21, H.2, HL.2 can be supplied either metallized or clear.

Osram Valves

Write for the OSRAM Wireless Guide (1932 Edition) Sent Post Free on request.

MADE IN ENGLAND

Sold by all Wireless Dealers

EXTRA QUALITY WITHOUT EXTRA COST



QUESTIONS ANSWERED

Working Out Impedance

J. R. (Bexhill).—“Will you please tell me how I can calculate the impedance of an iron-cored choke for any particular frequency?”

Let the inductance be called *L* and the frequency *N*, then the impedance will be:

$$X = 6.28 \times L \times N.$$

N is in cycles per second, *L* in henries and *X* in ohms. Thus the impedance of 30 henries at 50 cycles is:

$$6.28 \times 50 \times 30 = 9,420 \text{ ohms.}$$

Shock From an Aerial

O. D. (Wolverhampton).—“Recently, fearing that my aerial might get struck by lightning, I disconnected this during a storm, leaving the lead-in wire hanging free. After the storm was over I attempted to connect this to the set and received a violent shock. Why did I get this shock?”

You got this shock because the aerial was charged up as an insulated conductor. As you go up and up into the air, the electric potential increases with increasing height. In a thunder-storm this potential increases more rapidly than when the electric state of the atmosphere is more stable.

Your aerial was acting as one plate of a condenser, the other side of which was the earth. When you touched the aerial lead-in the charge on the aerial wire passed through you to earth, and you received a shock.

The moral is that when you disconnect your aerial during a storm, always earth it as well. Use a proper earthing switch on the aerial lead-in, preferably fitting it outside the house.

The Best Wire to Use

R. N. (Dulwich).—“Can you tell me whether the gauge of wire used for an aerial is important? I know that 7/22 is the more commonly used wire, but I have a quantity of No. 20 gauge

hard-drawn copper on hand, and I would like to use this if possible.”

For all practical purposes as far as reception is concerned the gauge of wire is unimportant. Unless yours is a very exceptional case you would not notice any difference in signal strength between two aerials using the gauges of wire you mention.

There is, however, another viewpoint. The aerial must have sufficient mechanical strength, and a flexible stranded wire is, of course, less likely

mains unit from the vicinity of the set in order to stop the hum. Why was this?”

The most probable reason, M.S., is that the magnetic field of the H.T. transformer in the unit was coupling with your L.F. transformer or filter output choke in the set, and in consequence you were getting a pure induction effect, which resulted in the hum you mention. When you removed the mains unit away from the L.F., circuits the inductive effect was eliminated.

Build an iron case round your mains unit, so that it is completely screened, and try again.

TECHNICAL QUERIES DEPARTMENT

Are You in Trouble With Your Set?

The MODERN WIRELESS Technical Queries Department is in a position to give an unrivalled service. The aim of the department is to furnish really helpful advice in connection with any radio problem, theoretical or practical.

Full details, including the revised scale of charges, can be obtained direct from the Technical Queries Department, MODERN WIRELESS, Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this all the necessary literature will be sent to you, free and post free, immediately. This application will place you under no obligation whatever. Every reader of MODERN WIRELESS should have these details by him. An application form is included which will enable you to ask your questions so that we can deal with them expeditiously and with the minimum of delay. Having this form you will know exactly what information we require to have before us in order to solve your problem.

London Readers, Please Note: Inquiries should not be made in person at Fleetway House or Tallis House.

to break than a single wire of 20 gauge. Therefore, if you want the aerial to last up for a long time and successfully to withstand the winter storms, 7/22 gauge will suit you best.

Eliminating Hum

M. S. (Sutton).—“I recently built an S.G., detector and 1 L.F. receiver, which I used in conjunction with a home-constructed A.C. eliminator. I first of all placed the mains unit in the case with the set, but found that a most appalling hum ensued. I was, therefore, compelled to remove the

Microphonic Howling

R. H. R. (Exeter).—“I recently constructed a new set, and before placing it in the cabinet I tried it out on the bench. When I switched on I got a loud howl which started quite softly and gradually built up in intensity until it drowned everything. I switched off and went over the set to see whether anything was loose, at the same time moving the loudspeaker to another part of the table.

“On switching on again, the set was quite normal, and remained so until I moved the loudspeaker back again into its former position, when the howl again commenced. Is the loudspeaker to blame or the set?”

This is a case of a microphonic howl caused by the sound waves in the loudspeaker impinging upon one of the valves, probably the detector. When you place your set in its proper cabinet it is quite possible that you will have no further trouble.

On the other hand, you can try screening the valve from all external sound waves by wrapping cotton wool round the bulb; some valves are more microphonic than others, and very often a change over to another type will remedy the trouble once and for all.



TRACK RADIO TROUBLES EASILY

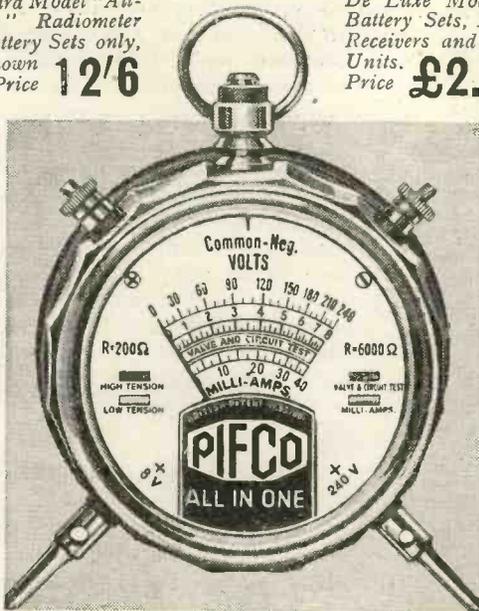
Put an "All-in-One" Radiometer on the trail, and the hunt is quickly over. In an amazingly short time this instrument will track down the trouble.

There is no other instrument in the world like the "All-in-One" Radiometer. It works with an accuracy that must be seen to be fully appreciated. Every single component of any radio set can be tested swiftly and surely. Ask to see it at your Radio Dealer's or Electrician's.

If in any difficulty, write direct to :
PIFCO LTD., High Street, MANCHESTER.

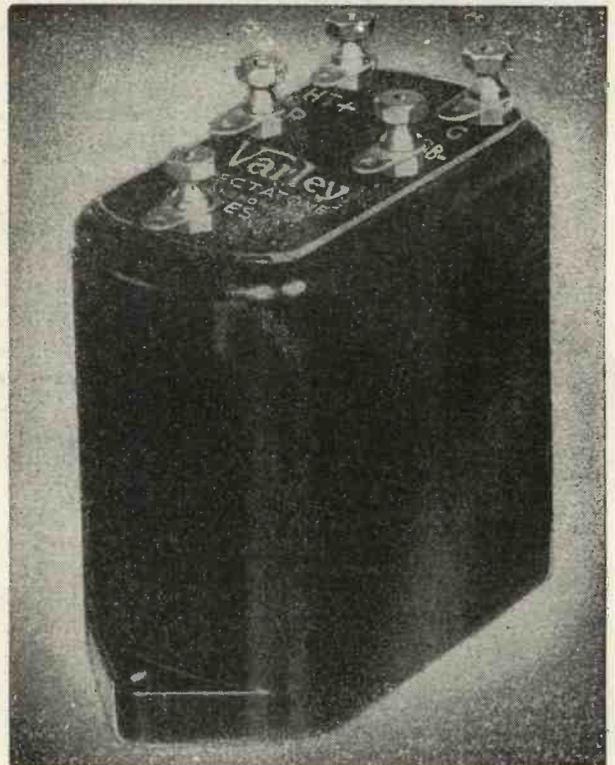
Standard Model "All-in-One" Radiometer for Battery Sets only, as shown here. Price **12/6**

De Luxe Model, for Battery Sets, Electric Receivers and Mains Units. Price **£2.2.0**



Φ B

PIFCO ALL IN ONE RADIOMETER



RECTATONE

1. Has a rising response curve from 1,000 to 4,500 cycles.
2. Balances any form of sound reproduction.
3. Restores a weakened treble to its correct value.
4. Gives a variable compensation and therefore complete control of tone correction.
5. Gives the required tone-correction without an extra L.F. stage.
6. Becomes at will and instantly a normal straight-line transformer.
7. The ideal L.F. coupling for selective sets.
8. Particularly useful where the same L.F. amplifier is used for radio and gramophone reproduction.

Step-up ratio 1:7. Can be used in all the usual methods, either direct coupled or choke or resistance fed, with or without the tone correction feature in each case.

List No. D.P.33 - 15/-

Varley

Proprs. : Oliver Pell Control Ltd.

FREE COUPON

To Messrs: Varley, Kingsway House, 103, Kingsway, London, W.C.2.

Use this coupon

Please send me, free and post free, the "BOOK OF THE RECTATONE"

Date.....

Name.....

Address.....

M. W. I.

HOW METERS CAN MISLEAD

by **M.G. SCROGGIE**
B.Sc., A.M.I.E.E.



You buy an H.T. battery—106 volts. Your dealer tests it for you with a perfectly reliable voltmeter which shows 104 volts. "Well up," you say. But what happens when you take it home and put it in your set?
"Don't trust a meter until you know how and why it works" is the moral of this article.

NOTHING is perfect, and even the best voltmeters and ammeters (and other less-known kinds of meters) are liable to a certain percentage error. It might reasonably be supposed, however, that having paid big money for a meter of, say, British First-Grade Accuracy, or Sub-Standard Accuracy, the possible error would be limited to the very small percentage specified.

Don't Be Over-Confident

The owner of such an instrument, bearing the name of a famous maker, is in danger of being over-confident

which it is connected, and sometimes there is not very much power to spare.

It is like trying to measure the speed of a baby car by attaching to it a 10-ton lorry containing the speedometer.

When you buy an H.T. battery (or a power unit, for that matter) the dealer obligingly connects a voltmeter across it to demonstrate that it is up to the mark.

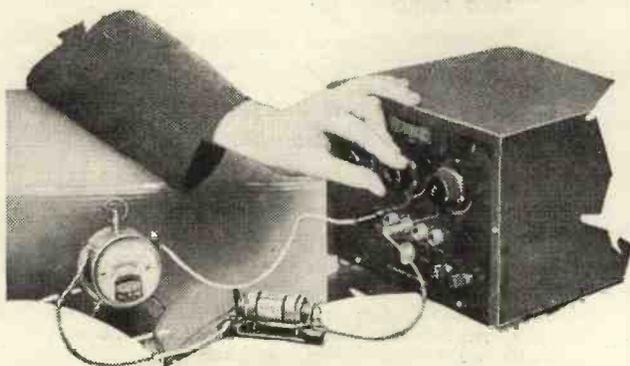
But unless you know something about the voltmeter and something about your receiver, you are not in a position to tell what you are paying

ohms, the cunning dealer may show you the reading on a perfectly reliable 0-150 1,000-ohms-per-volt voltmeter. This has therefore a total resistance of 150,000 ohms, and consequently only 2 parts in 152 are lost in the battery, and the meter reads over 104 volts. "Well up, sir!"

Trouble at Home

You take it home and use it on your receiver which draws 15 milliamps. This causes 30 volts to be lost in the battery, leaving only 76 for the receiver. You are lawfully dissatisfied with the results, and apply a cheap moving-iron 0-100 voltmeter with a resistance of 30 ohms per volt, and are horrified to see the oscillating pointer settling down towards the 63-volt mark. You take it back to the shop, but the dealer has a cast-iron reply, for his voltmeter's credentials are unimpeachable.

There are various ways of getting at the truth of the matter. Perhaps the simplest is to connect a really good high-resistance voltmeter across the battery *when it is actually working*. It will make the reading slightly low, but generally not enough to matter much with a battery. With a power unit even a 1,000 ohms per volt is barely enough for accuracy; unfortunately, anything above that is rather expensive.



This photograph shows how, when testing a mains unit, a resistance may be used with an ordinary voltmeter for the purpose of securing the necessary 1,000 ohms per volt; though even this is barely enough for real accuracy.

about the readings which it gives, and may not be aware that sometimes he is just as likely to be misled as his friend with a cheap "non-stop dancing" meter.

A clock may be a marvellously accurate piece of mechanism, keeping time within a minute, but take it over to America, and, through no fault of its own, it is forthwith five hours fast. Much the same sort of thing is liable to happen with electrical meters, particularly in radio.

for. What you want to know is the voltage of the battery when it is driving your set. Of the voltage generated by the battery—or power unit—part is used up in overcoming the internal resistance, and only the remainder is available for useful purposes.

The internal resistance of a battery increases as it ages, and so the available voltage drops. If the battery is a 106-volt one, and is rather a stale sample with a resistance of 2,000

With Weaker Currents

If there is this difficulty right at the source of energy, how do we fare when we try to measure voltages where the currents are feebler? The answer is that unless we are prepared to make all sorts of calculations to allow for the current by-passed by the meter, there is little hope of being able to believe the readings.

Of course, it is quite useful to be able to check the existence or

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The Difference Between Average and Effective Values

otherwise of volts at various points, and so detect interruptions in the circuit, but that can hardly be described as measurement. In the case of grid circuits where there are resistances of megohms, it may not even be possible to tell whether there is a reading or not, as practically all of the small available voltage may be absorbed.

This is particularly important when measuring automatic grid-bias voltage, for with modern valves every volt means a difference of anything up to 7 or 8 milliamps. in the anode circuit, and it is just at this point where voltmeters let us down most sadly, for high-resistance decoupling devices are commonly used.

More Reliable Methods

A milliammeter is a much more useful instrument for this purpose, as it may be used to measure the current in the biasing resistor, and that multiplied by the resistance gives the voltage drop. But a more reliable method still is to use it to measure the anode current itself, which is what matters most.

If there is a dependable tapped grid battery available it may be connected in parallel with the automatic bias; the voltage which most nearly leaves the anode current unaffected in this process is the nearest to the actual voltage getting on the grid from the automatic bias.

Milliammeters themselves have their pitfalls. They necessarily possess a certain amount of resistance, and being connected in the main current stream this absorbs some of the voltage from the circuit.

It is an easy matter to multiply the resistance of the meter by the current indicated, in order to decide whether the resulting voltage drop is serious or not. This is generally less troublesome to take account of than the disturbing effect of the current used by voltmeters.

Caught Out!

There are many who are able to look after themselves in these matters who are subject to being caught out by another little subtlety on the part of electrical instruments. Most good-class meters are of the moving-coil type, which are perfectly delightful in many ways, so long as they are used for unvarying currents and voltages.

Most people know that they must be used only on D.C., which is

generally taken to be any current which is always going in the same direction. But if there is a big ripple on it, such as would be the case in the unsmoothed output of a rectifier, one is liable to be fogged by all sorts of discrepancies.

Both are Right

It is possible for two perfectly accurate meters, one moving-coil and the other moving-iron, to be connected in the same part of the same circuit, and yet to show considerably different readings. They are both right. One indicates the average and the other the "effective" value.

An illustration of this is afforded by the example of a rectifier used for accumulator charging. Owing to the back pressure of the battery only the peaks are effective in charging, and the charging current takes the form of intense spurts lasting only a very small fraction of a second, separated

It should be clear, therefore, that any evidence based on the reading of a meter, though it be supported by a certificate of the National Physical Laboratory itself, must be submitted to searching cross-examination before it is allowed to sway judgment. The most guileless witnesses drop horrible bricks at times.

CALCULATING POWER CONSUMPTION

By HANDEL REES.

I AM frequently asked to explain how the power consumed by a mains set is calculated.

To take a simple case, consider a set taking H.T. only from A.C. mains. Let us suppose the total anode current to be 10 milliamps. at 120 volts. The unit of "power" is the

Don't test your H.T. battery like this — you will find the results very misleading. Try connecting a really good high-resistance voltmeter across the battery while it is actually working. It will make the reading low, but not enough to matter.



by comparatively long periods of nothing-doing.

As it is the average current that counts in battery charging, a moving-coil meter is the correct thing to use, but an indicator or fuse lamp which would glow quite dimly on a steady current of the same magnitude unexpectedly burns out on a battery-charging circuit using a rectifier, owing to the much greater effective current, i.e. effective for heating. A moving-iron meter may read more than double that of a moving-coil.

It's the Peak

Again, both are right. Another paradox of such a circuit is that it is possible to charge a battery from a rectifier outfit which shows a lower voltage than the battery.

In this case the peak voltage is the important quantity, and that is not indicated by either type of meter!

watt, given by volts \times amperes. Since the current is in milli-amperes, we divide by 1,000 to convert it to amperes. Hence, watts (per hour) = $10 \div 1,000 \times 120 = 1.2$ watts.

That is the power actually used in the set, but we must also allow for the total input power to supply various losses, etc., in the eliminator. If this is equal to the power used in the set the input becomes 2.4 watts.

Now, the "unit" of electric supply is equivalent to 1,000 watts per hour; therefore, $2.4 \text{ watts} = 2.4 \div 1,000 = .0024$ unit per hour. With energy at 6d. per unit this works out to .014d. or, roughly, one seventieth of a penny per hour.

The procedure is the same in calculating filament consumption, only, of course, the quantities are considerably larger, e.g. a filament taking 1 amp. at 4 volts consumes 4 watts.



The B.B.C. is instrumental in raising some £50,000 a year for national charity. Here are a few little-known facts about the Sunday evening appeals told by one who is behind the scenes.

AT Broadcasting House there is a "secret list" of people who can always be relied on to broadcast on behalf of a charity. But on the occasion of some appeals that have been broadcast, the organisers of the charity, hospitals, housing associations or whatever it may be, have themselves put forward a "name" for broadcasting; some celebrity having agreed to give a little talk in order to raise money by B.B.C. publicity.

Some listeners switch off at the beginning of an appeal. Others pay little attention to the talk, but make a note of the address.

Still others try to gather some of the spirit which the broadcaster tries to convey in his talk and so work up a little enthusiasm for private collecting on behalf of the charity. Few listeners know of the huge sums of money raised by broadcast appeals, no matter whether it is the Prince of Wales himself or merely a publicity representative of a small hospital.

Broadcasting's Adopted "Baby"

Broadcasting's own charity is the British Wireless for the Blind Fund, by means of which most blind people have now been given selective little sets, with special tuning, so that they do not have to fumble with the dials. This fund has been a great success, and Mr. Winston Churchill spoke on its behalf on two Christmas Days. Its success was not merely a flash in the pan.

One of the most successful broadcasts was that made on Christmas Day, 1928, when the Prince of Wales (at great personal inconvenience, incidentally) went along to the studio and gave a broadcast appeal for the "Miners' Distress Relief Fund."

This was not, of course, the only publicity put out for this fund, but in only a few days over £350,000 was subscribed.

Members of the acting profession have always been well to the front in any work for charity.

Here is Miss Violet Loraine, the darling of thousands of theatre-goers, whose appeal earlier in the year for the Children's Country Holiday Fund was almost as successful as her return to the London stage in June.

Sir Nigel Playfair, Mr. Henry Ainley, Dame Sybil Thorndike and Lady Tree are some of the foremost of the stage "stars" who have made appeals.

Many Successful Appeals

Practically every type of broadcaster has given an appeal, and it is not always titled people who have the most success.

A. J. Alan (in a private studio, of course, as with his own broadcasts, in order to preserve his anonymity) talked for a quarter of an hour on the Royal London Ophthalmic Hospital, and succeeded in bringing £4,600 as a result!

John Galsworthy has broadcast an appeal, too, and managed to raise £2,227 for the Housing Associations. Sometimes the B.B.C. is called upon to act as the almoner for a charity.

This means a lot of work at Broadcasting House, but the B.B.C. has set aside a special department for it. There are now over two hundred people who regularly send in donations, and the amount available for distribution to various charities, week by week, is about £19.

Although times are hard, B.B.C. charity is still rising.

The Week's Good Cause for one year was £64,000, as against £40,000 for the preceding year, and the amount still goes up.

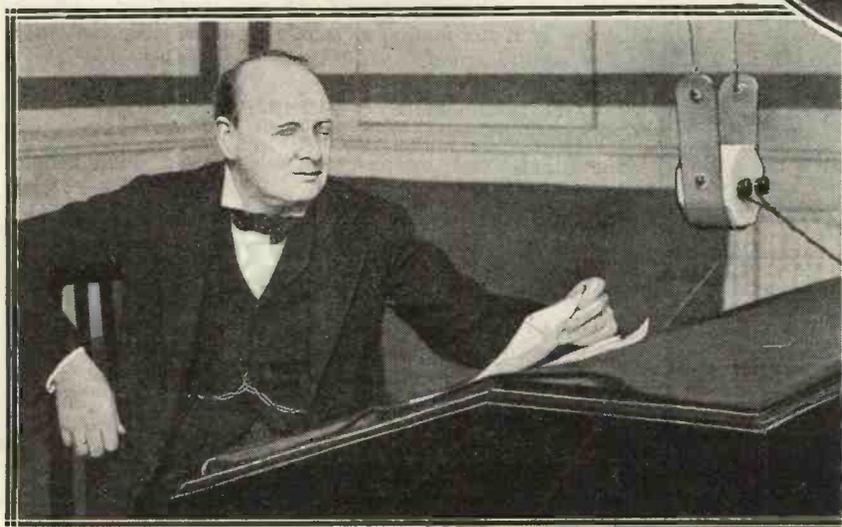
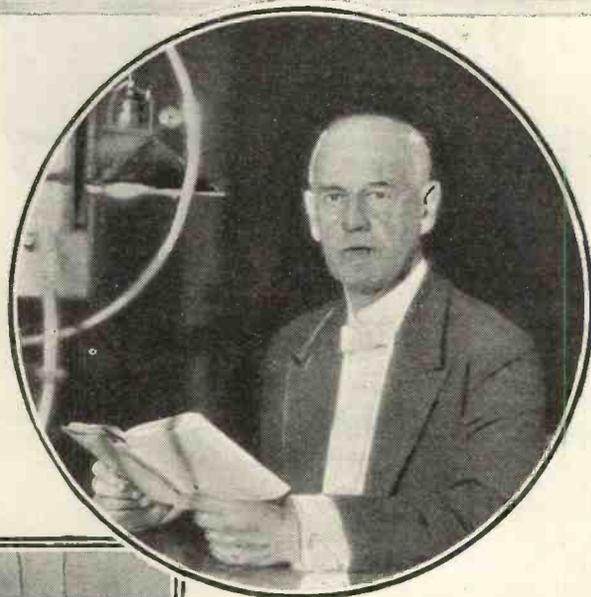
Special Committee for the Work

There is in existence an Appeals Advisory Committee who, as a section of the main B.B.C. Board, select out of the multitudinous requests the weekly charities which shall be broadcast.

Anybody who is in charge of some charitable organisation and wishes to get an appeal broadcast should note that the Appeals Committee put the request under four headings: Health, National Services, Children, and Social Service.

The sad part of the Committee's work is turning down requests which, perhaps because the charity is not of vital importance, cannot be broadcast. Sometimes it is possible to make an allowance out of the fund available in the B.B.C.'s charge for distribution to charities, but the B.B.C. does not set out to be primarily a charitable institution!

One of our best appeals' broadcasters was the late Lord Knutsford, who gave a bumper appeal for the London Hospital and raised nearly £20,000.



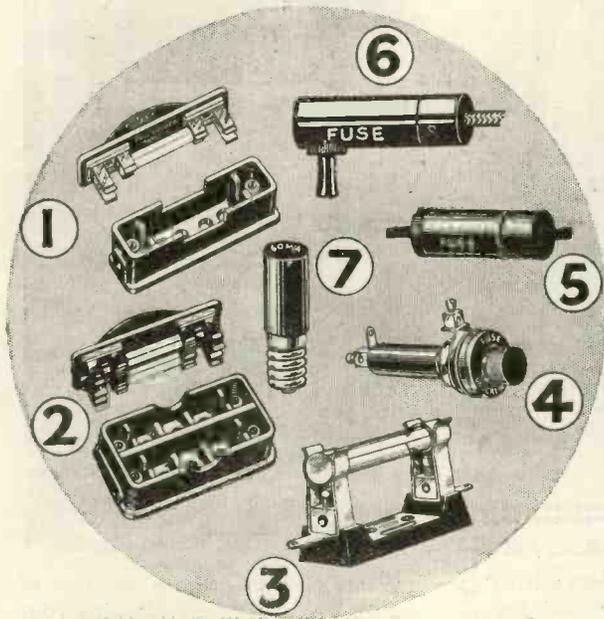
The most successful appeal ever made was broadcast, as might be expected, by His Royal Highness the Prince of Wales. The Prince's speech was the chief factor in raising £350,000 for the "Miners' Distress Fund" in 1928.

Mr. John Galsworthy (seen in the circle) was another successful appeal speaker when he raised well over £2,000 for the Housing Associations.

Mr. Winston Churchill (on the left) has a strong microphone personality which makes him ideal as a speaker in the cause of charity.

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Programme 1932-33



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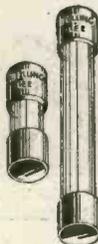
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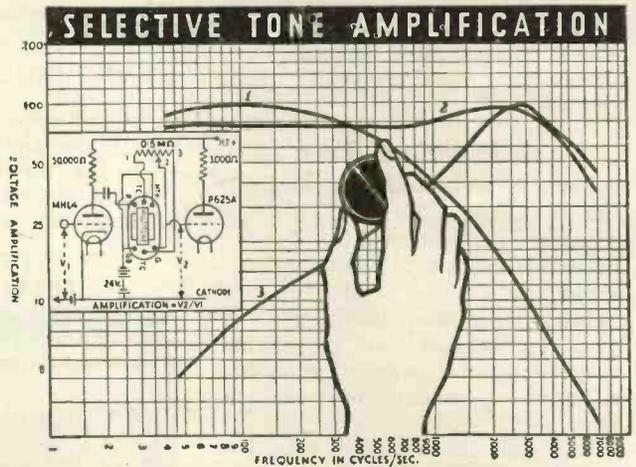
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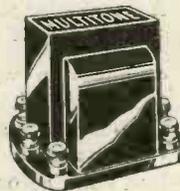
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SHOULD RECORDS BE HANDLED?



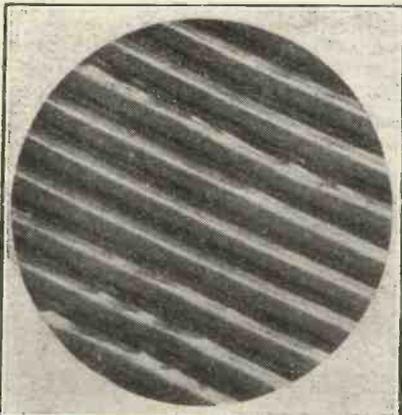
MANY enthusiasts would have us handle our records as if they were the most delicate things in the world. According to these individuals, it is only permissible to handle records by their extreme edges. To my way of thinking, however, all this is entirely false, and the above conclusions are not borne out by experience.

A Practical Test

Modern records are exceedingly durable things, so far as their actual material is concerned. Pressed, generally speaking, from a composition made up of shellac, mineral barytes, flock, lampblack, and sometimes one or two other ingredients, they are capable of standing up against a surprising amount of wear and tear.

It is difficult to scratch a modern record with anything much softer than a steel point, particularly if the

MICROSCOPIC VIEW



It is obvious that dust in the ridges will do no good to the record.

By J. F. CORRIGAN, M.Sc., A.I.C.
A lot of nonsense has been uttered on the subject of the handling of radio-gram records, but here are the facts set out by a recognised expert.

attempt is made on the polished blank edge of the record, and not directly across the recorded surface.

Try it yourself, if you are inclined to doubt my words. A lead point

PLAYING UNDER DIFFICULTIES



A record being played after its surface has been thickly coated with vaseline.

crumples up very easily when applied to the record. It will hardly mark the outer edge at all, and it is only by vigorous and heavy rubbing of a lead point across the recorded surface that an abrasion can be made.

Celluloid, wood, bone will hardly scratch a record; nor will one's fingernails, unless they happen to be very vigorously applied to the record directly across its recorded surface.

Hence, if you make a practice of grasping records firmly, allowing your thumb and finger to come into contact with the recorded surface, it is hardly possible at all that the record will undergo abrasions due to finger-nail scratches.

The Effect of Grease

Some kindly but, nevertheless, mistaken individuals bring up the old bogie relating to the injurious effect of the natural grease of the skin upon the surface of the records. This is, indeed, a fallacy. Grease does not injure records. Try the following experiment:

Place a record upon the turntable of your machine and cover the recorded surface with a nice thick layer of vaseline, working the grease well down into the grooves of the record.

THE OLD "EDISON'S"



They had to be handled with the greatest care, owing to the soft wax employed.

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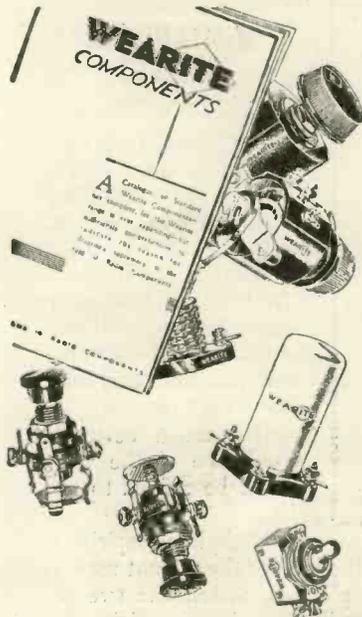
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Please send me

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Name.....
Address.....

* Cross out if not required. M.5

"Grease Cannot be Said to Injure Records"

Then play the record, using an ordinary sound-box for the purpose, instead of a pick-up, in order to eliminate the chance of the vaseline getting into the delicate pick-up armature and thus unbalancing it. The record will play perfectly well, and there will be less surface noise.

Without removing the grease from the record, put it away for a week, a month, three months, or even six months, and then play the record over again. During the interval of standing the grease will not have exerted any softening effect on the record surface, and the record will play quite satisfactorily.

Harmful Oils and Solvents

Hence, grease cannot be said to injure records. Consequently, no amount of skin-grease from finger-tips could have any conceivable detrimental effect upon the surface of a gramophone record. Here it should be mentioned that some oils and solvents have an injurious effect on records, owing to their specific solvent action. Turpentine, acetone, methylated spirit and a few other substances do destroy record surfaces; but, fortunately, such substances do not exude from the finger-tips!

Matters were much different in the days of cylindrical phonograph records. These articles, as some of you may remember, were very fragile things. Being wholly made up of a wax-like material whose surface was very soft, and thus was easily scratched, they had to be kept in cotton-wool lined boxes, and their handling was an act which required considerable care.

But, as regards modern radio-gram records, it is, I think, a very great fallacy to suggest that these articles are susceptible to ill-effects and

detrimental changes resulting from mere normal handling. Naturally, if after doing a bit of gardening you enter the house and then proceed to rub your soil-laden hands across the record surface, you do run a risk of injuring the records, but this is not the case if you handle records with normally clean hands.

longed immersion in acid baths, and in solutions of various chemical salts. In every instance the record so treated showed no deterioration in its playing properties after being carefully rinsed and dried. This fact adequately disposes of the "acids in the skin" theorists, who hold that the minute traces of acid in the natural grease of the skin can act injuriously upon gramophone records.

Songs Down the Ages

By JESTER.

IT was the Age of Stone. His name was Glug; By choice and training just a common Thug. His grunts and gurgles as he smote a bear, Or dragged his newest wife home by the hair, Were Songs of Business. These he sang at dark And dawn, before the cave's mouth, as a lark. The hapless cave-wife who forebore to cheer, Was hung up by the lugs—to train her ear. His fellow clubmen had to smile and clap, Or learn Glug's Old Notation—*tap by tap*. The gods had mercy. From a mammoth's bite Glug passed, with Score and Baton, out of sight.

NEXT, as a Norseman, Tosta, he appears, Bellowing about booze and shining spears. Down came his war-boats on the Essex coast, His warriors betting who would kill the most; Then shoreward leapt, intent on gore and loot, And in this crisis Tosta chose to toot! The Saxons fought like dogs, their dead piled high, Nor till they heard his *aria* did they fly. Mellowed with mead, distent with half-raw sheep, The wearied Vikings ranged themselves for sleep. Tosta perforce must sing, would they or no; So Tosta perished—on the Upper Doh!

LATER in Time, Sir Watkin came to Town, Questing to sing away a kingly frown. Ninth offspring of a needy knight, his hope Was marriage with a Beauchamp or a Scrope. His stock-in-trade, besides his Voice, was naught Save velvet togs and hat all feather-fraught. He sang his way up from the Outer Walls (Where lowbrows pelted him with codfish balls) To the dread presence of Carolus Rex. Who specialised in Nell Gwynn—and in necks! To please the Queen he hymned the Orange Flower— And went to sing his swan song in the Tower.

GLUG, Tosta, Watkin, he is with us yet, Emitting noises we would fain forget. And that the Ancient Evil still shall be, The Fates have given us the B.B.C. Still boom the burly Bassos. Still we feel Misogynous when pretty *primas* squeal. The crooning tenor with his negroid rhyme, Still slays the golden silences of Time.

Perchance 'tis just. Man's wounds by Man are made.
We forged the sword; now must we taste the blade.

Safeguard the Surface

A modern record is less susceptible to injurious consequences from handling than is an ordinary photographic plate or film. Consequently, provided that you take reasonable care to keep your record surfaces free from gritty dust, there is no reason at all why any amount of normal handling with the fingers should ever injure the records or cause them to deteriorate.

MISHANDLED VALVES

MANY listeners remove valves by pulling them out by their glass bulbs.

What is the result? The bulb parts company with the base. If the wire holds out the valve will function, and may last a long time.

How much better it would be if the bulb could be refixed to the base.

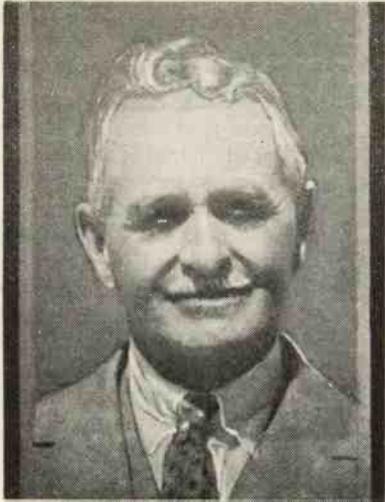
Methylated spirit is best for the job, for the cement used in the first place to fasten the two together readily dissolves in spirit. So if you pour a small amount round the base of the valve, and press the bulb and base together, you will probably succeed in cementing them together.

But whatever you do, don't pull the valve out by "the hair" again.

F.B.

Accumulated dust and grit in the grooves of a record shortens its life more than anything else, frictional wear apart. Therefore, keep your records well dusted and, so far as possible, in a dust-free place. In these circumstances, no amount of clean handling will harm them.

Recently I have been playing records which have undergone pro-



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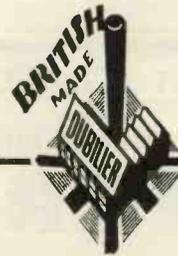
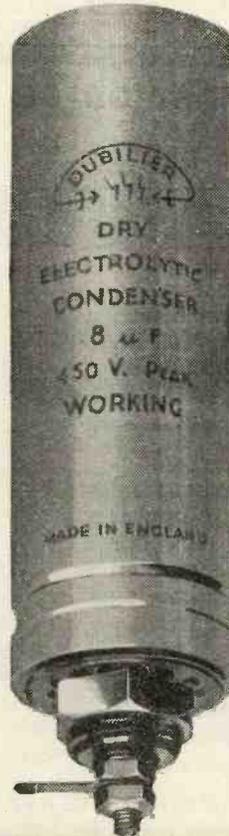
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RADIO NOTES and NEWS of the MONTH



Big Business

THE Radio Manufacturers' Association states officially that something like £50,000,000 worth of radio goods will pass into the hands of the public as a result of Radiolympia. In fact, the R.M.A. has booked Olympia for five years ahead, and certainly on the foundation of the facts recently made public it seems a wise move.

A £30,000,000 Turnover

It is estimated by the R.M.A. that sales of sets this year will be approximately 1,200,000 battery and 800,000 electric sets. Orders have been placed for 10,000,000 valves and 20,000,000 batteries. Turnover on sets is estimated at £30,000,000 and valve sales at £5,000,000, batteries account for £10,000,000, and other components £5,000,000.

Last Year

Last year the Exhibition provided £29,000,000 worth of business. It was estimated that this represented a sale of 1,250,000 sets, 6,000,000 valves, and 16,000,000 batteries.

Radio as News

The organisers of Radiolympia certainly can't complain of the publicity given them in the Press. In the national and daily newspapers—apart from MODERN WIRELESS and its contemporaries—there were nearly 3,500 column inches of editorial matter about the Exhibition. Of this amount the National dailies gave 1,700 inches, the evening newspapers gave more than 600 inches,

while nearly 600 inches were given in the Sunday papers.

Barristers and B.B.C.

The Law Society has informed the B.B.C. that there can be no possibility of the removal of the ban on barristers and other members of the legal profession broadcasting under their own names. The B.B.C. had hoped to include eminent K.C.'s, and even Judges, for a series of mock trial broadcasts.

However, the B.B.C. will not abandon the series of mock trials, but actors will take the parts of Judge and Counsel. In all likelihood they will provide much more amusement. Listeners are to be the jury.

Too Loose?

Dr. Toulouse, a French expert on nervous diseases, recently gave it as his opinion that when powerful wireless broadcasts were taking place it was harmful for tired people, for over-worked people, and for children who had little power of resistance. It was because sensorial excitement was bad for the mental equilibrium.

He is Horrified

"When I think of the buildings which contain hundreds of flats,
(Continued on page 404.)

A VOLTMETER OF FIRST GRADE ACCURACY

is essential to all radio builders.

FERRANTI METERS

are of accuracy guaranteed within the limits of the British Standard Specification No. 89, for first grade Moving Coil Instruments.

A wide open scale (110°-2½ inches) ensures accurate readings in all ranges. Particularly useful instruments for normal purposes are the **Types 16P and 17P**. For measurements in very high resistance circuits, the following are recommended.

TYPE 25P - - - £3 : 8 : 6
Ranges 7½-30-15 volts.

TYPE 26P - - - £3 : 14 : 6
Ranges 10-50-250 volts.

Resistance, 1,000 ohms per volt.

TYPE 16P - - £2 : 12 : 6
Range 7½-30-150 volts.

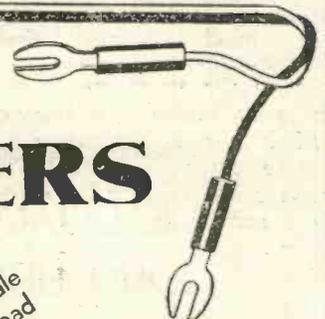
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Range 10-50-250 volts.
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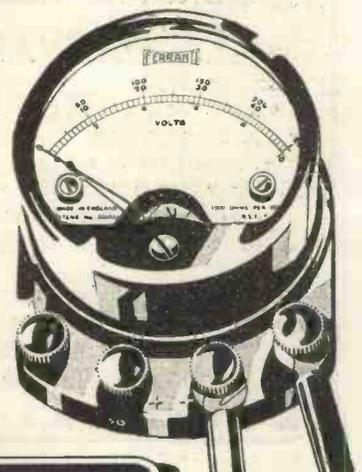
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For this fine three-valver the designer specifies a Utility 3-ganged condenser. Therefore, trust the designer, he knows, and insist on being supplied with a Utility W314/3, the condenser that is permanently matched.

**W314/3
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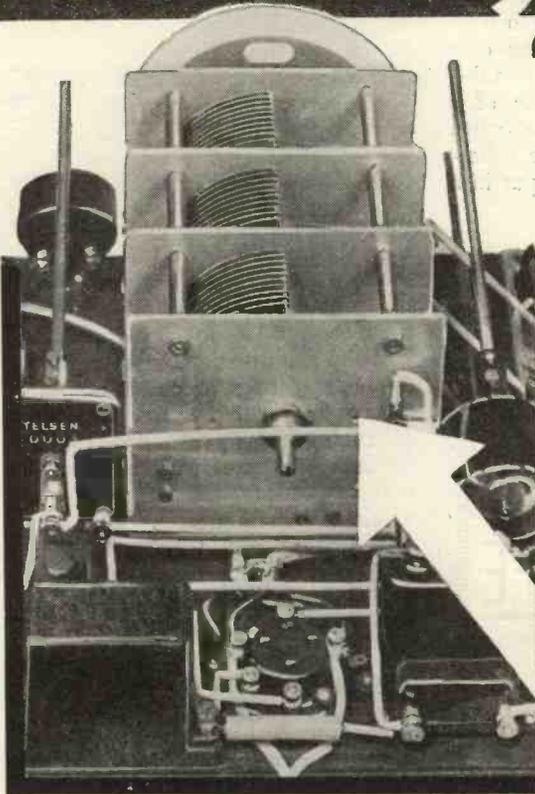
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Have you had a copy of our new catalogue which features the finest range of variable condensers available?

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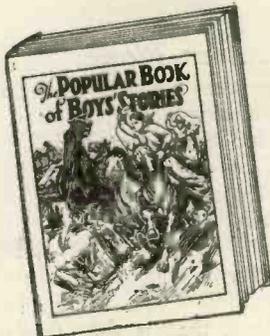
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COILS**

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Pair of matched Aerial and H.F. Coils mounted on aluminum base, with gang-dial switching 16/-
Pair of Band Pass Coils and H.F. Coil similarly mounted and switch-ganged 23/6

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Each component must function correctly with its neighbour—that is why you need Formo Dual Range Coils. They are matched with a scientific care that ensures maximum efficiency, and they give you exceptional selectivity. Each Formo Coil too, has its distinguishing colour to help you when rebuilding or wiring your set. Don't hesitate—use Formo components—you can't use better.

The FORMO CO.

Crown Works, Regents Park, Southampton.
London: 23, Golden Square, Piccadilly, W.1.

RADIO NOTES AND NEWS OF THE MONTH
 —continued from page 402

and the number of wireless sets in them, I am horrified," stated the doctor.

However, he doesn't condemn wireless altogether—which is a good thing for wireless!

Listeners might take the tip and remember that if they are feeling a bit nervy it may be because they are listening too much, or because their local station has increased its power too much. For a remedy, we suggest they write to Dr. Toulouse!

How Many Listeners?

Statistics recently published by the International Broadcasting Union at Geneva show that about 26,000,000 receiving sets are in use in the world to-day, and that a world-wide audience probably totals 100,000,000 listeners. Approximately 10,000,000 new listeners are enlisted every year.

Coming Talks

The recent Talks Programme issued by the B.B.C. is not startling, but covering the period October to December listeners will note that there should be an improvement in the news service, as the B.B.C. intends supplementing the bulletins with more elaborate eye-witness accounts. New books will be reviewed by G. K. Chesterton, the famous author, and by E. M. Forster; Lord Macmillan and Mr. C. H. S. Fifoot will broadcast talks on the Law; and there will also be political discussions on the Means Test, the Tariff Issue and on Disarmament.

Health Topics

There will be a new series of health talks, including a morning series under the title "A Doctor to a Mother." An unusual absence in the list of talkers is that of a music critic. Apparently the B.B.C. has decided to discontinue musical criticisms.

B.B.C. Too Superior?

At a recent radio critics' luncheon—a feast which seems to be held with spasmodic regularity—given by Major Gladstone Murray, Assistant Controller of the B.B.C., Sir Harry Brittain, a newspaperman himself, who was present, suggested that the B.B.C. was too superior, and he advised the B.B.C. to attack the Press. This instructive and constructive suggestion was probably made by Sir Harry without considering the

editorial support given to the Radio Exhibition recently, details of which I have given in a foregoing paragraph.

Those Critics

Apart from this suggestion of Sir Harry's, the luncheon seems to have been a luncheon and nothing else, for although a good deal was said—especially by one radio critic of a newspaper—it would seem that when radio critics forgather, their collective wisdom might easily be put in a nutshell!

Frivolous Broadcasting

Our Chief Radio Consultant, who is on his way home from Australia, seems to have had a grand time in Melbourne. At a dinner given in his honour there he told how Dame Nellie Melba took part in the world's first broadcast performance, and how the then British Postmaster-General was

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considerably annoyed by what he termed "its frivolity."

P.P.E.'s Anecdote

"Not long after the war," said P. P. E., "I was given the job of building a high-power station at Chelmsford, and we conceived the idea one day of broadcasting a performance and of asking Melba to assist us. Although she sang into a crude microphone, her performance gave delight to thousands in all parts of England, but afterwards we received a formal reprimand from the Postmaster-General for this frivolous employment of wireless equipment, and we were warned to cease activities calculated to hamper legitimate wireless service."

Too Much!

The following figures are a sufficient comment on the foregoing paragraph: Number of wireless licences issued up to August 31st, 4,821,326. An increase of 28,044 during the month.

Net amount of cash absorbed from listeners by the G.P.O. since the inception of British broadcasting—something with a deuce of a lot of noughts behind it. Anyway, whatever the figure is to-day, it's obviously far too much!

EDITORIAL
 —continued from page 317

subscribe 10s. a year in the form of a licence fee to the B.B.C., the G.P.O.—and don't forget the Treasury—for the privilege of operating a wireless receiver, not so much to pick up British broadcasting programmes, but to pick up foreign programmes. Rob the average listener of his opportunity of tuning in foreign broadcasting stations and we will wager that licence receipts fall 50 per cent within twelve months.

And what would happen to the radio industry if foreign broadcasting stations were persuaded to reduce power to such an extent that only the nationals concerned could pick up programmes from those stations? Further elaboration of the criticism of this proposal put up at Madrid is obviously unnecessary.

The suggestion may be condemned as fatuous and, were it not for its absurdity, dangerous in the extreme. There is, of course, very, very little likelihood of it being put into practical effect, but, nevertheless, it is most disquieting to hear that an official B.B.C. representative should have put up such a suggestion, for it is hardly likely that he would have done so without permission from Head Office, and that permission would hardly have been given had there not existed a completely inadequate and misconceived idea of what attracts a vast section of the listening public to-day.

Ridiculous Plans

Let us hope that we shall hear no more of such ridiculous and half-baked plans for remedying the interference problem—a problem, by the way, which is in its present state of chaos primarily because the Soviet authorities will not come into line in a constructive effort to adjust wavelengths more equitably and sanely. In fact, that is the second piece of disquieting news to date—the obstinacy of the Soviets to come into a pool whereby all European nations might get together to put the wavelength situation on a practical basis.

COLVERN -T.D.COIL

SPECIFIED FOR THE D.C. "DIODION"

(Described in this issue)

**AN UP-TO-DATE COIL WITH
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TYPE T.D., an entirely new COLVERN COIL, designed to give super selectivity on both long and broadcast wave-bands.

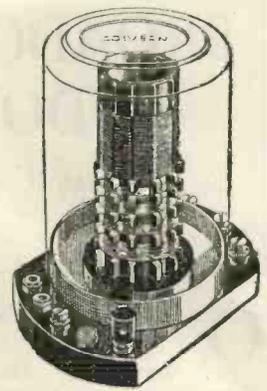
The coil is completely screened, giving a very neat appearance, and incorporates tapped aerial coupling and reaction, while the four alternative aerial tappings are arranged as sockets with a wander plug.

The first two tappings give aerial couplings similar to those normally employed but with greatly increased selectivity.

Nos. 4 and 5 give a high degree of selectivity with weak aerial coupling—suitable for use in a "swamp" area.

A most important feature of this coil is that there is no break through on the long wave-band from B.B.C. stations.

Our 1933 Booklet Radio List No. 10 is now available and free on request.



TYPE T.D.

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"Mansfield" Senior Improved PM4. "Mansfield" 42'—Complete Senior PM4. "Mansfield" 27'6—Complete Junior PM4

Whiteley Electrical Radio Co., Ltd., Radio Works, Mansfield, Notts.

London Office: 109, Kingsway, W.C.2.

Irish Free State Distributors: Kelly & Shield, Ltd., 47, Fleet Street, Dublin.

BROADCAST EDUCATION— DOES IT HELP?

By a Special Correspondent who is a House-Master at a famous Public School.

ONLY the other day I read the following in a London daily newspaper: "Had I the blessing of radio in my schooldays my general knowledge would have stood a more severe test."

As this was written about the same time as the publication of the Nine Pamphlets for the Central Council for School Broadcasting, I wondered whether this correspondent (a lady, by the way) referred to broadcasting in general or to broadcasting to schools in particular. In any case, for my purpose, it matters little.

The fact remains that this lady, like myself, was born at a time when, in the educational world, the three R's were all-powerful, when the basis of all important knowledge was reading, writing, and arithmetic, and when anything else outside the scope of these three subjects was regarded as a luxury and not essential for one's well-being.

A Comprehensive Scheme

But to-day education has been revolutionised, and nothing is more indicative of the completeness of that revolution than the fact that the B.B.C., in the rôle of the people's university, goes so far as to exclude two of the R's from its curriculum altogether.

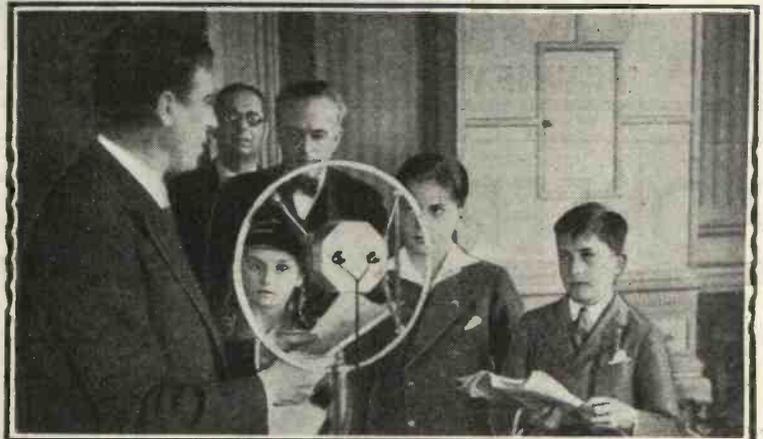
In their place we find a comprehensive scheme of work classified under the nine headings of "World History," "Tracing History Backwards," "Life and Work in Europe," "Rural Economy," "Your Body Every Day," "Early Stages in French," "Music Lessons," "King's English," and "Talks for Older Pupils (in French and German)." Truly an ambitious programme, and one that should prove more of a blessing than the modest curriculum of bygone days.

I have carefully studied the nine pamphlets, and particularly the several introductions setting forth the aims and objects of the experts responsible for drawing them up. The feature that struck me most was the thoroughness, completeness and up-to-dateness of the work contemplated.

This was especially noticeable in the preface to the history pamphlet, in which occurred this significant remark: "Such boys and girls should be helped by the broadcasts to see the connexion between the history they have studied at school and the world of complex and important problems they are about to enter." Yes!—"the history they have studied at school."

As I read these words, I thought instinctively of the history I and others of my generation studied at school; and the word "dates" came readily to my lips.

VOICING THEIR VIEWS TO VIENNA



The Austrian Minister of Education asks local schoolchildren for their opinion of Vienna's Parliament House during a recent broadcast tour of the city with a travelling transmitter and a portable microphone. These "tours" are frequently undertaken, and are broadcast to schools all over the country.

To us history meant nothing more than dates, and as a result of my study of history I became an authority on dates. There was a time when I couldn't be caught out, not only with dates of important historical events, but also with those of incidents which seemed hardly worth recording.

The Case of Bate

I still remember, for instance, that the year 1608 won fame by the fact that, that year, one named Bate had a Case. Who Bate was, or what was his Case, I don't know. I don't think I ever have known, and I am quite certain that my history teacher never required me to know.

The all-important thing to remem-

ber was "1608, Bate's Case." No more, no less! Such was history in my childhood's schooldays.

I had confirmation of this some little time ago when I was walking along a main road with an old school friend of mine whom I hadn't seen for a long time. A number of cars passed us, and in every case (when possible) my friend could give the event in history whose date corresponded with the number of the car.

A pleasant means of shortening distances, perhaps, and as such the only justification for the date-method of learning history.

Real and Alive

Things are different now. The subjects of the twelve history talks as given in the pamphlet show at once the new attitude towards history teaching.

Here they are: "Public Opinion," "Growth of Public Opinion," "British Commonwealth of Nations," "The Three British Empires," "Money," "The Story of the Pound," "Educa-

tion," "Schools in Earlier Times," "The Irish Question," "The Story of England and Ireland," "East and West," and "Europe's March Eastwards."

How very real and alive all this is in the light of modern events. Sometimes we think things happen in a night, whereas, in actual fact, the seeds were sown some long time ago which, after years of slow and steady growth, have at last come to fruition!

Surely, this is what history really is, the story of the growth and development of good and bad tendencies, extending over long periods of time with an occasional incident of outstanding importance, so outstanding

(Continued on page 408.)

CLIX "MASTER" PLUG

Yet another important reason why you should choose and use the CLIX "Master" Plug.

The wiring device provides positive

METAL TO METAL CONTACT

—a most important point.

1 1/2d.

Widely variable and non-collapsible prongs giving firm grip, full surface contact with any H.T. or G.B. socket-



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"DEMOCRACY AND THE B.B.C."

A letter from the Provost of Dingwall about the situation in the Highlands.

Sir,—I was very pleased to read the article under the above heading appearing in your issue for August.

Lord Strathpey says "the B.B.C. is a dictatorship, pure and simple." He is quite accurate in his description.

The B.B.C. works under a Royal Charter. The B.B.C. states (page 38, Year Book, 1930) the Corporation is not a Government Department. By reference and having regard to their lack of provision for the Highlands that is a compliment to Government departments. For no Government would have dared to embark upon a twin-transmitter policy without having sufficient wavelengths

A SPECIAL ANNOUNCEMENT

We are pleased to be able to announce that in future

READERS' QUERIES

about "M.W." sets will be answered free of charge providing that the set is built exactly to specification.

Any of the alternative makes of component parts, etc., may, of course, be used, but modifications or alterations in the design will render the query liable to our usual charges.

with which to carry out effectively such a policy, any more than the village tailor would begin to cut a suit without first taking stock of his available cloth.

The B.B.C. states "its activities are limited only by that Charter and licence." That is so on paper only. Actually, being an irresponsible body, their twin-transmitter policy has been limited only to England and Southern Scotland, to the exclusion of the Highlands. In this respect they have deliberately committed a breach of their Charter, which requires them to act for the national interest. The Postmaster-General, who alone has the necessary jurisdiction, has refused to act as a Court of Appeal. The B.B.C. is therefore an autocracy. This state of affairs cannot be allowed to continue, and all who have the interests of democracy at heart must use their influence to bring the B.B.C. under proper control.

Yours faithfully,
ANDREW MURRAY,
Dingwall. Provost.

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CASH—C.O.D.—or H.P.

IMMEDIATE DELIVERY

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KIT "A"

Author's Kit, complete with 4 brackets for mounting condensers, etc., but excluding valves, cabinet, motor, pick-up, and speaker.

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	£	s.	d.
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1 B.T.H. Synchro Blue Gramo. Motor	1	12	6
1 Mullin L.E. transformer	1	17	6
1 Ferranti O.P.M.8 output transformer	1	12	6
1 Pick-up and tone-arm, British Radiophone	1	2	6
1 Epoch 99K loud speaker	7	7	0
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(Described in this issue).

KIT "A."—Author's Kit, comprising all specified components, with Ready Drilled Panel but excluding Valves and Cabinet.

Cash or C.O.D. £11/19/5.
Or 12 monthly payments of 21/11. Sent Carr. Paid.

(Battery Model).

(Described in last issue.)
KIT "A."—Author's Kit, containing ready drilled panel, screen, and terminal strips, less Valves and Cabinet.

Cash or C.O.D. £5/14/0.
Or 12 monthly payments of 10/6. Sent Carr. Paid.

IMPORTANT.—Parts, Kits, Miscellaneous Components, Finished Receivers or Accessories for Cash, C.O.D. or H.P. on our own system of Easy Payments. Send us a list of your wants. We will quote you by return of G.O.D. orders value over 10/- sent carriage and post charges paid.

1933 ADAPTAGRAM

Transform your Set to a thing of beauty with this Modern Walnut Cabinet that is the craftsman's last word in style and appearance. Decorated with carefully matched inlaid walnut veneers of contrasting colour. Hand french polished to reveal the hidden beauty of grain only to be found in the finest Walnut, while bringing to perfection the acoustic properties of the correctly proportioned speaker compartment. Gives a new and better tone to your Set; adds beauty to your home at minimum cost.

MODEL A.—Comes to you with vignette front (as illustrated) and motor-board, ready to take your own Set, Gramophone Motor and Pickup. Suitable for all popular Sets described in all the leading technical journals. Dimensions: Height, 38 1/2 in.; width, 21 1/2 in.; depth, 15 1/2 in. Panel size: 18 x 8 in.; baseboard depth, 14 in. Speaker Compartment, 17 x 19 1/2 in. Clearance between motor board and underside of lid, 4 in. Ready fitted with back. Baffle Board 3/6 extra if required.

63/-

Carriage and Packing 2/6 extra England and Wales. Or 12 monthly payments of 5/9.

Supplied without standard vignette, but drilled to your own specification, 3/6 extra.

MODEL B.—Standard 1933 ADAPTAGRAM. Garrard Double Spring Motor. 12" Plush-covered Turntable. Automatic Stop. B.T.H. Tone-arm with Pick-up and Volume Control complete. Automatic Needle Cup that delivers new needles one at a time to your finger tips. Cash or C.O.D.

6 GUINEAS

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HEAYBERD MODEL HDC.150 MAINS UNIT (For D.C. Mains).

TRIPLE ADJUSTABLE OUTPUT: 15, 25 or 50 ma. at 150 volts.

TAPPINGS: 60/120v. Var. S.G., 0/150v. Var. and 150v. Fixed.

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RADIO CABINETS

"FIRST IN THEIR CLASS"

Model No. V26. Beautiful Radio-Gram. Cabinet, 3 ft. 2 ins. high, 1 ft. 10 ins. wide, 1 ft. 4 1/2 ins. deep. Accommodates any type of gramophone motor and set with Base-board, 19 ins. x 14 ins. or smaller. Hand Polished. Prices:

- OAK - £3.15.0
- MAHOGANY - £4.0.0
- WALNUT - £4.5.0

All Models Carriage Forward.

Write to-day: STAND 90 (Galery) for FREE Northern National Radio Exhibition, City Hall, Manchester. Latest Models. Post Free. Sept. 28—Oct. 8.

Model V26

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The Picture Paper with the MOST News
SUNDAY GRAPHIC
and SUNDAY NEWS.

BROADCAST EDUCATION— DOES IT HELP?

—continued from page 406

that it is given a date. In the past we remembered that incident and especially its date, while the great movement of which the incident was a part was ignored.

The Dark Ages

But it is not so now. Stephen King-Hall and Robert Beloe have given us their word for it.

The same sort of change has come over the teaching of Geography, too. In a very attractive pamphlet, complete with illustrations, we find no trace of a suggestion that children will be expected to know only the bays on the east coast or the promontories on the west coast.

Geography of that order belongs to the dark ages of the past. But we find instead that Europe is going to be investigated in a series of talks by experts who are going to lay special emphasis on the human aspect, leaving the physical and climatic background to the school teacher.

How very interesting all this should be, and how very different from the old geography that could only be mastered by the child with a good memory.

Another pamphlet that caught my eye was the one on Elementary Biology and Hygiene.

As I read its pages I recalled that, in childhood days, this subject was discontinued after one lesson because one or two boys with rather sensitive stomachs couldn't refrain from being sick at the sight of a chart displaying, among other things, the human entrails.

All Very Useful

Dr. Winifred Cullis' pamphlet contains one of two such illustrations, but I hope my experience will not deter her from pursuing her arranged course. Children have perhaps changed since my young days. Even if they haven't, I quite agree with Dr. Cullis when she says that the more we understand the way our bodies work, the better we can use them.

The number of experiments included in the course are all very useful, and even the simple ones illustrate truths of which many adults to-day are colossally ignorant.

Then there are Sir John Russell's talks on Rural Economy, every bit as vital as any of the foregoing to those in quest of a real and useful

education. It appears from his pamphlet that his chief aim is to make it clear to the countryman of the future who his competitors are, and to that end, says Sir John, "it is imperative that children should learn something of foreign methods of production and of marketing, to see if they can learn from them something that will be to their advantage."

Of the Music Lessons by Sir Walford Davies I will say nothing beyond express the hope that he will succeed in teaching the rising generation to a better discrimination between the good and bad music that comes hourly through the millions of loud-speakers up and down the country.

His pamphlet suggests that, as usual, his talks are going to be thoroughly enjoyable, but I hope that the more serious side of his programme will catch on, not only with the musically-minded children, but also with those whose home life is lived to the accompaniment of never-ending "background music."

The remaining pamphlets are also revelations of the new era. Whether success has been achieved in the past in teaching a foreign language I have grave doubts.

Not Fit Fare

I can't help feeling, somehow, that the experts responsible for this study over-estimate the capabilities of their pupils. I cannot agree with them in their contention that Ronsard, Du Bellay, La Fontaine, besides many other authors, are fit fare for learners, though these may be older pupils; for these authors are decidedly difficult. Experience has taught me that there is nothing more calculated to sicken children and to set them against a foreign language than to force foreign verse down them.

After all, lovers of English verse are a distinct type of folk. You must admit that the masses read prose and enjoy it, because they understand it. How much more likely is it, then, that English children should want French prose?

"What's in the News?" is perhaps one of the gems of the time-table, but the pity of it is that the subject isn't thought worthy of more than twenty minutes' study per week. This ought to be a daily lesson.

Mr. Vernon Bartlett and his colleague are an ideal pair for the job, and if they achieve their object, viz., to encourage an intelligent reading of the newspapers, both daily and weekly, the children of to-day will acquire a sense of values and proportion that was not the inheritance of their fathers.

ONE-WAY RADIO

Some thrilling reminiscences of wireless in wartime in the Sinai Desert.

I WAS young in years (seventeen), but a comparatively old hand at the games of war and radio when I celebrated Christmas, 1916, in the Sinai Desert of Egypt. A funny sort of Christmas that withal, blazing sun overhead and miles of waterless sand all around.

I had been with the Royal Flying Corps for two years, and nearly all that time I was in Egypt with No. 14 Squadron, fighting flies and tropical diseases.

Christmas passed in comparative peace, and then I received the following written orders :

"You and three other ranks will proceed to Railhead Kilo 139 tomorrow, taking with you two days' rations and water, one wireless set, one bell tent, four rifles, one Lewis gun, and two camel loads of petrol and oil. On arrival at Kilo 139 you will report to Lieut-Col. True, General Staff, Desert Column, who will provide you with camels. You will be responsible for these camels, and that they are watered and fed. You will then march to El Arish, reporting to Officer Commanding Imperial Camel Corps at Hill 200, one mile south of El Arish. You should obtain a guard from here and then proceed to El Fagira aerodrome, which is two miles S.E. on the east bank of the Wadi. It is marked by a circle on the ground about 25 yards in diameter. Wireless station will be erected here. Rations will be obtained from Imperial Camel Corps.

(Signed) P. P. JOUBERT,
Lieut.-Colonel,
Advance Headquarters.

In the Field.
27/12/16.

In the Desert

You might consider that those were detailed instructions, but, my goodness, didn't that twenty-five-yard circle take some finding ! We bumped up and down on those camels for hours trying to locate it. At last we found it—nearly covered with sand. El Fagira had been a Turkish aerodrome, but the only thing the Turks left behind them when they vacated it was that half-erased circle !

Well, there I was, with one quickly erected bell tent, "three other ranks" of the R.F.C., and four Camel Corps

(Continued on page 410.)

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—how to ensure it

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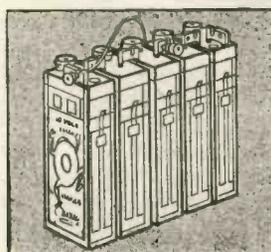
Because each 2-volt cell is "air-spaced" from its neighbours the Lively 'O' H.T. Accumulator is leak-proof. As a result it gives all its power to work your Set. Cell-to-cell leakage is eliminated. It is full of life and vitality right up to the time when it needs recharging (every 3 or 4 months). It gives your Set the constant voltage that it needs. Every Wireless Dealer sells the Lively 'O'.

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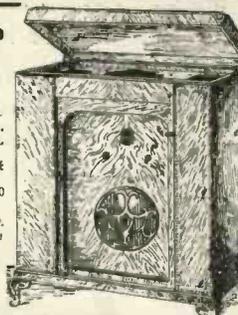
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ONE-WAY RADIO
—continued from page 409

sentries. A telegraph line was in due course run to the Camel Corps camp one mile distant.

This was accomplished before night-fall, and in the evening I walked over to the "white circle" and stood there in blissful contemplation of my aerodrome. Yes, MY aerodrome, for henceforth I would be officially known as "Officer Commanding Fagira Aerodrome."

A Visitor Arrives

I was very proud of that, even though the aerodrome was nothing more than one bell tent stuck in the middle of a flat, featureless stretch of sand. From any point within half a mile of the landing circle there was nothing at all to be seen but sand. Even the Camel Corps camp one mile away was hidden from sight by a softly rising dune.

The next day a major, mounted on a camel, paid me a visit. He was, I think, from G.H.Q. He asked for the officer-in-charge, and when I said simply: "I am the officer-in-charge," he laughed and said something about the war being fought by children. I just smiled politely, arrogantly self-complacent in the knowledge that for all his field rank I could have ordered him away from my aerodrome, for he did not appear to have any official business. And if he had refused, why, there were my "three other ranks," complete with revolvers, rifles, and Lewis gun, and my Camel Corps guard to place him under arrest!

An Emergency Aerodrome

The Fagira aerodrome was really only an advance landing ground. Owing to the spread-out nature of desert warfare, and the fact that the front line was in a state of wide-flung flux all the time, the squadron had installed itself 60 or 70 miles farther west.

Our job was to pick up the wireless messages from machines on scouting and artillery observation work, and telegraph them back to headquarters. Also, we had a stock of petrol and oil from which aeroplanes running short of fuel could be replenished.

A further task was to send news of enemy aircraft which might come within our range of vision.

We hadn't been there more than about three days before there was a violent change of front, and the

morning guard relief from the Camel Corps gave us the interesting news that our troops on the east had wheeled south, thus leaving my aerodrome stuck out into what would have been a "No Man's Land" had there been enemy troops in front. But apparently there weren't. "So," said the Camel man, "you needn't worry about Turks. All you've got to do is to keep your eyes open for marauding Arabs."

"That," I said stiffly and pointedly, "is your job."

But I must admit that I lay awake some time that night with a creepy feeling tingling through my spine. You've heard how "marauding Arabs" sneak up like ghosts and how they treat their victims! But the low-toned conversation of the sentries outside was reassuring.

Left in the Lurch

The next morning no relief guard appeared on the scene at the appointed hour of eight o'clock. But we were lax in the daytime, and when the "old" guard suggested they should "buzz off," I let them go.

Two hours passed without any sign of the new sentries, so I issued orders that a message should be telegraphed to the Camel Corps camp. I wasn't worrying about sentries so much as the sandbag of gritty biscuits and "bully," and can of lukewarm, chemically treated water they should be bringing.

"No reply. Line's down," said the operator.

The "line" was merely a thin red cable laid on the sand, so I told one of the men to follow it back and repair the fault. He followed the line for its whole mile of run, only to discover that there was now nothing on the end of it!

The Camel Corps had gone. Our source of armed sentries and rations and water had completely disappeared. Worse still, we were entirely cut off in regard to communications as well, for our radio outfit was only a crystal receiver.

The "S.O.S." Signal

You can imagine, no doubt, how panic-stricken I was. I didn't know what on earth to do. Officer-Commanding Fagira Aerodrome! What a mockery that was then—and there were those three other chaps looking to me for guidance.

But there was one grain of hope. We had long strips of American cloth with us for the purpose of fashioning signals to passing aeroplanes. I had a "T" sign laid out on the sand at

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ONE-WAY RADIO
—continued from page 410

once. That was a request that any machine which saw it should land.

But nothing appeared in the sky the whole day except an occasional vulture. The sun was about to set when one of my men heard the sound of an aero engine. We rushed to the tent door and at once saw the aeroplane flying towards us from the north.

Attacked from the Air

"Well, that is that!" I said, with relief.

"It is," rejoined one of the others, quietly. Then I, too, saw that it was an enemy machine. We rushed for our rifles and the machine-gunner tore over to his Lewis gun. But the enemy machine flew straight over, circled, and then made for where the Camel Corps had been camped.

By now the sun, with Eastern rapidity, had disappeared, leaving a bright moon. Boom! Boom! The plane was bombing an empty camp. There was a drone of ever-increasing loudness. A dark shadow swept overhead. Rat! Tat! Tat! Flashes of flame. He was machine-gunning us. We could now clearly see him. He swooped down. Tat! Tat! Tat! We replied just as fast as we could work our rifles.

"The so-and-so! He'll drop a so-and-so packet when he's finished playing with us!" grumbled the machine-gunner as he quickly changed the drum of his gun. The gun jammed, he picked up a rifle, but it was empty, so he drew his revolver and fired that at the big bird!

A Restless Night

But we didn't get him, and what is more important to my way of thinking, he didn't hit any of us. Nor did he drop a bomb!

That night none of us could sleep a wink. I had detailed sentries, and myself took spells of this duty. The while two men patrolled around the camp armed each with two revolvers and a rifle, the other two sat inside the tent facing each other tensely across the flickering light of a guttering candle. We played cards, we smoked, we talked, but all the time our ears were pricked for sounds across the desert.

The howl of a pariah dog would make us almost jump out of our skins.

But the long night passed without incident.

In the morning our courage returned, but our tempers were raw-edged.

"No so-and-so water, one tin of 'bully,' and three biscuits!" grumbled one of the men. "What do you propose, skipper?"

I hadn't the faintest idea what we could do. If I sent one of the men out scouting I might be sending him to his death either by hunger or thirst, for we had no maps and compasses, and for all we knew El Arish might now be in the hands of Arabs or Turks. Where the nearest British troops might be was quite without our comprehension. We could just wait hopefully where we were, it is true, but that was an unpleasant prospect.

"One of our chaps is sure to come this way," said the machine-gunner hopefully. I quickly agreed. But would he come in time, I thought, for we had seen only about two of our machines the whole time we were there.

Nothing but Sand

Later that day I had an idea. It was that we should all march out as far as we could in a north-westerly direction without losing sight of the tent. Then one man would stay at that point, the remaining three marching on till they were only just

within sight of the first marker, and so on.

That plan came to nothing, for even when the "chain" got dangerously long the man who was farthest away from the aerodrome could still see nothing but sand.

We tried another direction, and that gave us a real shock, for our scout spotted a band of armed Arabs.

They may be have friendly, but we couldn't risk testing that with our tiny numbers.

Relief at Last

For a whole further twenty-four hours we mooned miserably around by day and shivered in fear by night, the while our mouths grew parched with thirst and our eyes nearly burned out through scanning the skies and the horizon.

Our radio receiver was nothing less than a torment, for we frequently heard aeroplane wireless signals very faintly; and once we heard, quite loudly, what sounded like a field wireless transmitter.

The morning of the third day found my small band nearly desperate, and when one of them said he could hear an engine we thought he was delirious.

But he wasn't. Soon a speck appeared in the sky. It was coming in

(Continued on page 412.)

Graham Farish (The Wireless Pioneer) Says:-



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GRAHAM FARISH LTD.
195, Masons Hill
Bromley, Kent.

ONE-WAY RADIO

—continued from page 411

our direction. Was it British or German? We strained our eyes in an attempt to see until they nearly burst from our heads. Suddenly the man who was sitting at the radio receiver croaked: "He's ours!"

We didn't cheer—we were past that by then.

In response to our ground signal the machine landed and the pilot was amazed when he heard our story. Apparently we had been entirely forgotten—temporarily, at least.

Out of Water

There had been an encircling movement on the part of the Turks, and the Camel Corps had had to move off without a moment's notice. He thought we must actually have been some miles behind the Turkish lines for at least a few hours. However, our troops had now advanced, and we were quite safe once more.

"Haven't got any water left," he said apologetically in reply to my urgent enquiry, but to my utter astonishment he produced a full bottle of gin. I was too surprised to query why he was carrying it, and don't know to this day. Anyway, it was no good to us.

"I'll buzz straight back and pick up something for you, though," he

said. And he did—a right royal "something," too. The squadron rose nobly to the occasion, and within four hours two machines were landing with water, food, chocolate, cigarettes, wine and every luxury that our comrades at the main aerodrome could rake up from canteen and home parcels. And for three further days we lived as surely no soldiers in the field ever lived before. We never thought once of asking for aerial transport "home."

Finally, however, marching orders came and our lonely sojourn in the desert ended.

That is sixteen years ago now, but I often look at my home radio and wonder what would have happened had that Fagira outfit been a three- or four-valver instead of a crystal set. You see, I'd have twisted it round into a low-power transmitter (that wouldn't have been hard) and my signals might have been picked up—by Turks, and I might have been— But there you are, I wasn't!

G. V. D.

IN PASSING

—continued from page 382

Dr. Thunk grasped the note. Then he made Louis jump two feet into the air by bursting into fluent German. And such dreadful words!

"Get your loudspeaker and listen," said Thunk. "What a fine O.B. effect! Smash and grab!"

There was a sound of broken glass, one shot, and a howl of human pain, and five policemen burst into the room.

"Just a practical joke, sergeant," sniggered Dr. Thunk. "Take me away and I'll pay the fine. This is Mr. Lewis' radio club, and I bet 'em I'd get the Bobbies my way quicker than by wireless."

A Dangerous Criminal

Outside, surrounded by the police, Dr. Thunk said: "Go back at once and arrest Louis. He is a dangerous criminal with a death-ray apparatus which he is pining to try out on a human subject."

"But how did you, etc.?" queried the Force.

"I heard a whole lot of conversation through the car's speaking tube. Then I burnt through the handkerchief round my wrists with the car's cigarette-lighter. I chucked out all my visiting cards, with requests that the police should follow a blue Kraimler car, No. 16500 XC. Finally, as the car drew up at 37, Grein Avenue, Beckenham, I released the carrier pigeon with the exact address."

I have been asked several times to explain the carrier pigeon.

I regret that I cannot do so. It was a dramatic necessity, and therefore I created it.

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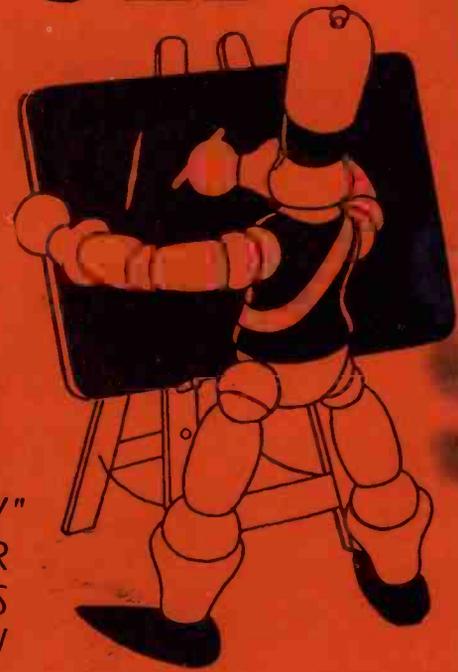
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